METEOROLOGICAL OFFICE
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MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COUNCIL,

1888—1889.

LONDON:
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1889.

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Office

MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COUNCIL.

1888—89.

116, *Victoria Street, April* 11, 1888.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (March 21) were read and confirmed.

Read.—The following draft letter in reply to the letter from the Directors of Ben Nevis Observatory (Minutes, 1887, p. 139), which was adopted, and the Secretary was instructed to forward it (P.C. 809), and also to forward a copy to the Treasury (P.C. 878) (Minutes, 1887, p. 133).

IN my letter to the address of Mr. Buchan, dated the 23rd of November last, on the subject of the observatory of Ben Nevis, I informed you that the Meteorological Council desired to assist the work there carried on, to the best of their ability, within the limits which they found to be consistent with other claims on the funds at their disposal, and that they would take an early opportunity of addressing you again on this subject.

When this letter was written the Council had been in communication with Mr. Buchan in the hope that some satisfactory understanding might be come to as to the form in which further assistance could be given to this observatory. Certain suggestions were made which, however, led to no practical results, and the Council did not feel themselves at that time to be in a position to make any specific proposals which would be likely to meet the views of the Directors of the observatory.

Mr. Buchan's nomination to a place on the Meteorological Council has led to the further consideration of the subject, in the light of the additional information which he has been able to supply as to the aims of the Directors, and I am now desired by the Council to request you to communicate to those gentlemen the following observations.

The Council now understand that it is in contemplation by the Directors to establish another observatory at Fort William, at the sea-level, in connexion with that on the summit of Ben Nevis, and that they seek for such aid as will enable them to carry out this object, which they regard as a very important adjunct to the existing high-level observatory. The scientific value of such a connected system of observation as might thus be established is not open to doubt, and the Council, on a careful consideration of their financial position, are glad to be able to offer their co-operation in the maintenance of such an observatory as is contemplated at Fort William, to the following extent.

After the Council are satisfied that provision has been made for the maintenance of such an observatory, with the help of the contribution they offer, they will supply and erect in the observatory at their cost the self-registering instruments which were originally at Armagh, but are now available for erection elsewhere, and they will otherwise complete the ordinary outfit of meteorological instruments. They will also make an annual grant of 250*l.* towards the maintenance of the observatory on the same general terms as those under which a similar grant has been made to the observatory at Falmouth (November 1883), which were expressed as follows:—

"The constitution of the Meteorological Council prevents their giving any positive pledge as to the continuance of a grant for the maintenance of the observatory, as this would bind their successors, which they cannot do; but the present Council will, so far as lies in their power,

E 53895. 25.—5/88. Wt. 304. E. & S.

continue the grant for at least five years, on the understanding that on two years previous notice the arrangement may be put an end to or modified, on the expiry of that term, or at any subsequent date.

"Further, it must be understood that the grant must in all cases be contingent on the requisite funds being voted by Parliament, and subject to the controlling power of the Treasury.

"It will be also understood that the observatory will, on its part, regularly supply the Meteorological Office with copies of records of observations such as are supplied by the other self-recording observatories."

The Council will continue the grant of 100*l.* yearly towards the Ben Nevis Observatory under the existing arrangement.

I am to request that these proposals may be considered by the Directors and their conclusions communicated to the Council, which will be ready to give careful consideration to any proposals that may be made in substitution or in modification of those explained.

Sir A. Mitchell, F.R.S.E., K.C.B.

Read.—Letters 741 and 744 from Professor Mascart (Minutes, 1887, p. 118), proposing that he should continue to forward MS. copies of the Atlantic telegrams, charging the Office only with cost of postage from Paris to London.

Mr. Scott was instructed to reply that the Council would gladly accept his offer, and would continue their present examination of this information in order to ascertain its utility in the service of storm warnings, &c. (P.C. 807).

Mr. Scott reported (Minutes, 1887, p. 139), that on the 26th ultimo he had received a letter (No. 688) from Professor Wild proposing that meetings of the chiefs of the principal meteorological administrations should in future be held, instead of International Congresses, and that, with the chairman's approval, he had written consenting to the proposed change (P.C. 716).

Letter 803 from Professor Wild was then read, suggesting that a final meeting of the International Meteorological Committee should be held at Zürich in September 1888. Mr. Scott was authorised to agree to this proposal (P.C. 823).

Read—A memorandum from Captain Toynbee reporting that since the last meeting 13 logs had been received, 10 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. A. S. Baxter -	"City of York"	May 23, 1887—March 4, 1888.	Liverpool, Portland (Oregon), and home.	1887, p. 5.
Capt. Jas. Campbell	"St. Patrick" -	Nov. 20, 1886—Dec. 8, 1887.	Maryport, Cooktown (Queensland), Baker's Island, and home.	1886, p. 64.
Capt. James Clarke, R.N.R.	S.S. "Olbers" -	Oct. 12, 1887—March 21, 1888.	Southampton, Monte Video, and home (2 voyages).	1887, p. 48.
Capt. George Janes	"Middlesex" -	May 30, 1887—March 20, 1888.	Cardiff, Singapore, Chittagong, and home.	1887, p. 5.
Capt. T. Leportier -	S.S. "Mira" -	Dec. 31, 1887—March 23, 1888.	Liverpool, Calcutta, and home, viâ Suez.	1887, p. 103.
Capt. R. H. Machugh	S.S. "Ching Wo"	Oct. 23, 1887—March 7, 1888.	Liverpool, China, and home.	1886, p. 106.
Capt. J. H. Price -	Bq. "Viola" -	Oct. 11, 1886—Feb. 13, 1888.	London, Vancouver, Iquique, and home.	1886, p. 36.
Capt. A. H. Sargent	Bq. "Glenlora"	May 12, 1887—March 13. 1888.	London, New Zealand, and home.	1886, p. 112.
Capt. W. Spratly -	S.S. "Mozart" -	August 7, 1887—Jan. 23, 1888.	Liverpool, Monte Video, and home.	1887, p. 49.
Capt. H. Walker -	S.S. "Cephalonia."	Sept. 7, 1887—March 24, 1888.	Liverpool, Boston (U.S.), 6 voyages.	1887, p. 49.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Submitted—The following report :—

SIR, Meteorological Office, March 31, 1888.

I HAVE the honour to report, for the information of the Council, on the work which has been done during the quarter ending 31st March 1888.

Current Charts.

Nearly the whole time of the female staff was placed at my disposal for this work early in the year, and the greater part of January was devoted to training; since then 110 logs have been entirely exhausted.

A number of currents have been plotted from logs borrowed from the various Steam Shipping Companies. The Deutsche Seewarte have also supplied us with data in the Mozambique Channel; six months' currents having been plotted from this source.

A chart showing the mean barometrical pressure over the sea for the year has been constructed during the past quarter.

I am, &c.
(Signed) C. W. BAILLIE,
Navg. Lieut. R.N.
H. T.

The Marine Superintendent.

Submitted the following:—

LIST of STORM WARNINGS issued to the COASTS of the BRITISH ISLANDS since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result, as to the character of the Warning.

1. WARNINGS ISSUED.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experieneed (if any), and Approximate Time of occurrence.	Result.* Character of Warning.
1888.				
March 21st, 7.15 p.m.	Ireland, S. (Galway only).	South cone	Neither gales nor strong winds -	C
,, ,,	,, E. (Belfast only).	,,	,, ,, -	C
,, ,,	Scotland, E. (Dunrossness and Wick).	,,	,, ,, -	C
,, ,,	,, W. -	,,	,, ,, -	C
	The main depression passed too far N. to affect our coasts, and its secondary proved to be shallow and unimportant, and moved S.Ewds.			
March 23rd, 3.10 p.m.	Ireland, S.† -	North cone	N.Ely. gales in W. early on 24th -	A
,, ,,	,, E.† -	,,	Neither gales nor strong winds -	C
,, ,,	Scotland, E. -	,,	Moderate to fresh gales from N.E., early on 24th.	A
,, ,,	,, W. -	,,	Neither gales nor strong winds -	C
,, ,,	England, N.W. -	,,	,, ,, -	C
,, ,,	,, W. (Milford only).	,,	,, ,, -	C
,, ,,	,, E. -	,,	,, ,, -	C
	Gale in N.W. of Ireland (northern part) though strong, hardly extended at all.			
March 27th, 3.15 p.m.	Ireland, S. -	South cone	Strong Sly. gale, night of 27th -	A
,, ,,	,, E. -	,,	Moderate to fresh Ely. gales, 28th -	A
,, ,,	Scotland, E. (Dunrossness and Wick only).	,,	Neither gales nor strong winds -	C
,, ,,	,, W. -	,,	Fresh N.Ely. gales, 28th - -	A
,, ,,	England, N.W. -	,,	Ely. gales and strong winds, 28th -	A
,, ,,	,, W. (Milford only).	,,	S.Ely. gales, early 28th - -	A
,, 4.25 p.m.	Scotland, E. (except Dunrossness and Wick).	,,	Neither gales nor strong winds -	C
,, ,,	England, W. -	,,	Moderate S.Ely. gales, early on 28th	B
,, ,,	,, S.W. -	,,	Varying gales, early 29th - -	A
,, ,,	,, S. -	,,	Strong squally S.E. winds, on 28th	B
,, ,,	,, S.E. -	,,	,, ,, ,,	B
,, ,,	,, E. - -	,,	Strong S.Ely. and Ely. winds and moderate gales, 28th.	B

* A = complete success (*i.e.*, justified by gales of force 8 or more, by Beaufort's scale).
B = partial ,, ,, ,, strong winds, forces 6 or 7 (Beaufort's scale).
C = failure (*i.e.*, not justified by either gales or strong winds).

† Information at present available for these coasts insufficient to give reliable results.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any) and approximate Time of Occurrence.	Result. — Character of Warning.
March 28th, 5.30 p.m.	Scotland, E. - -	North cone	Moderate Ely. gales, early 29th -	**B**
April 2nd, 7.10 p.m. -	Ireland, E. - -	North cone	Moderate Nly. gales, early on 3rd -	**B**
„ „ -	Scotland, E.† -	„	Strong Nly. winds, night of 2nd -	**B**
„ „ -	„ W.† -	„	Moderate Nly. gales, early 4th -	**B**
„ „ -	England, N.W. -	„	Neither gales nor strong winds -	**C**
„ „ -	„ E. (Tweed to Humber).	„	„ „ -	**C**

† Information at present available for these coasts insufficient to give reliable results.

SUMMARY.

A	-	-	-	-	-	-	-	=	8
B	-	-	-	-	-	-	-	=	8
C	-	-	-	-	-	-	-	=	13

2. GALES FOR WHICH NO WARNING WAS ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
11th April 1888.

Read.—Letter 734 from Mr. Eliot, stating that an observatory had been established at Aden, and that probably the light keepers at Perim would be instructed to keep a register. (Minutes, 1887, p. 126.)

Mr. Scott submitted a list of the Fishery Barometers belonging to the Office on the coasts of the British Isles, with notes as to their present condition, as obtained from replies to circulars issued by the Office.

It was resolved—That Mr. H. N. Dickson be requested to visit the fishery barometer stations from New Haven to Broughty Ferry (inclusive) under the direction of Mr. Buchan, Mr. Dickson to be allowed travelling expenses, and 1*l.* per day if sleeping out, 10*s.* a day if sleeping at home. The total expenditure not to exceed 15*l.* A report on results to be submitted to the Council. (P.C. 820.)

Reported—That the following instruments were required for the Meteorological Office stock :—

ADMIRALTY LIST.

			£	*s.*	*d.*
500 thermometers - - - -	cost		175	0	0
50 maximum thermometers 50 minimum „ } - -	„		65	0	0
50 thermometer screens - - -	„		25	10	0
		£	265	10	0

R. STRACHAN,
1888, April 11th.

ROBERT H. SCOTT.

—Approved.

Submitted—The following report on the forecasts for March 1888:—

The letters used have the following signification:—

a=complete success.
b=partial (*i.e.*, more than half) success.
c=partial failure.
d=total failure.

March.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	38	73	56	83
,,	b	42	12	27	
,,	c	12	4	8	
,,	d	8	11	9	
Scotland, E.	a	42	65	54	81
,,	b	27	27	27	
,,	c	23	0	11	
,,	d	8	8	8	
England, N.E.	a	35	56	46	83
,,	b	42	32	37	
,,	c	8	8	8	
,,	d	15	4	9	
England, E.	a	40	48	44	78
,,	b	44	24	34	
,,	c	8	16	12	
,,	d	8	12	10	
Midland Cos.	a	31	54	43	72
,,	b	42	16	29	
,,	c	15	15	15	
,,	d	12	15	13	
England, S.	a	28	56	42	72
,,	b	44	16	30	
,,	c	24	8	16	
,,	d	4	20	12	
Scotland, W.	a	31	54	43	72
,,	b	31	27	29	
,,	c	31	8	19	
,,	d	7	11	9	
England, N.W.	a	27	65	46	73
,,	b	35	19	27	
,,	c	27	8	18	
,,	d	11	8	9	
England, S.W.	a	36	80	58	82
,,	b	40	8	24	
,,	c	20	8	14	
,,	d	4	4	4	
Ireland, N.	a	16	62	39	72
,,	b	38	27	33	
,,	c	31	7	19	
,,	d	15	4	9	
Ireland, S.	a	23	58	41	77
,,	b	35	38	36	
,,	c	19	4	12	
,,	d	23	0	11	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	55	71	63	88
,,	b	23	26	25	
,,	c	13	3	8	
,,	d	9	0	4	
Scotland, E.	a	45	61	53	76
,,	b	13	32	23	
,,	c	23	0	11	
,,	d	19	7	13	
England, N.E.	a	42	71	57	85
,,	b	36	20	28	
,,	c	3	3	3	
,,	d	19	6	12	
England, E.	a	42	52	47	78
,,	b	32	29	31	
,,	c	7	16	11	
,,	d	19	3	11	
Midland Cos.	a	35	52	44	74
,,	b	32	29	30	
,,	c	23	16	20	
,,	d	10	3	6	
England, S.	a	36	55	46	79
,,	b	35	32	33	
,,	c	16	3	10	
,,	d	13	10	11	
Scotland, W.	a	26	52	39	68
,,	b	35	22	29	
,,	c	29	13	21	
,,	d	10	13	11	
England, N.W.	a	32	71	52	79
,,	b	42	13	27	
,,	c	13	10	12	
,,	d	13	6	9	
England, S.W.	a	65	58	62	81
,,	b	16	23	19	
,,	c	13	6	10	
,,	d	6	13	9	
Ireland, N.	a	35	58	47	73
,,	b	23	29	26	
,,	c	19	7	13	
,,	d	23	6	14	
Ireland, S.	a	48	39	44	68
,,	b	10	39	24	
,,	c	23	9	16	
,,	d	19	13	16	

Summary.

British Isles	a	32	61	47	77
,,	b	38	22	30	
,,	c	20	8	14	
,,	d	10	9	9	
British Isles	a	42	58	50	77
,,	b	27	27	27	
,,	c	17	8	13	
,,	d	14	7	10	

Submitted—The following statements of work during March 1888:—

MARINE ROOM.

April 10, 1888.

Examined 24 new logs and 2 lighthouse registers.

North Atlantic Weather Charts.

The reduction and preparation for lithography of the whole series of charts now completed, and the sheets to September 3, 1883, have been forwarded to the lithographer. Proofs received to July 26, and those to July 17 passed for press.

A chart showing the tracks of cyclonic disturbances during September, 1882, prepared.

General.

Discussion of the cyclones of May and June, 1885, in the Gulf of Aden and Arabian Sea.

Discussion of Red Sea data, and preparing results for Mr. Buchan.

Obtaining information for the legal department of the Board of Trade respecting the weather between England and the Mediterranean from December 26 to January 10 last (Letter M.O. 599).

Copying hydrographical notices from log 7,082.

Indexing data in ocean 10-degree squares.

The female clerks engaged charting current observations in the North and South Atlantic, and mounting and binding the charts. Also reproducing Mr. Meldrum's cyclone tracks for the Indian Ocean.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To 31st March 1888.)

Monthly Weather Report, 1887:—

January and February.—Published.

March.—In proof.

April.—Nearly complete.

May to December.—As before reported

Monthly Weather Report, 1888:—

January.—Half written.

February.—Tables, rough maps, &c. ready.

Weekly Weather Report, 1888.—Issued to date. Appendices, &c. well up to date.

Daily Weather Report, 1888.—Issued promptly to date. Monthly summary, corrections, &c. for February issued.

Checking Daily (3.30 p.m. and 8.30 p.m.) *Forecasts.*—Done to date.

Checking Storm Warnings.—Done to date.

Plotting American Daily Weather Telegrams.—Received, viâ Paris. Done to date.

Investigation as to the prevalence of Fog in the British Islands.—In progress; now being proceeded with more quickly than hitherto.

11th April 1888. (Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

April 1st, 1888.

Observatory Returns.—The means for August, 1885, completed, and the Hourly Readings copied and sent to printer. Proof of a part of the July sheets of "Hourly Readings" revised, and signed for press.

Quarterly Weather Report.—General summary for Part III., 1879, completed, and the monthly remarks nearly so. The weather maps for the part have been drawn.

Harmonic Analyser.—The analysis of the barograms for 1879 carried as far as Stonyhurst, the curves for which observatory are half finished. Several experimental curves were drawn and analysed for Mr. Buchan.

Miscellaneous.—Rainfall returns for 1887 prepared for Mr. Symons. Sunshine cards for 1887 (all stations), examined and packed up for storage.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

April 2, 1888.

Examinations.

April 1886.—Completed.

May 1886.—*Barograms* and *thermograms.*

1887.—Aberdeen, Falmouth, and Kew rain curves.

Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

April 1886.—*Notes of Errors* to Aberdeen, Armagh (anemograms), Falmouth, Kew (anemograms) and Valencia, and report thereon to Council.

Miscellaneous.

Mr. Call was absent one week on sick leave.

(Signed) T. E. ALLEN.

Reported—That the following cheques had been drawn during the month of **March**:—

1888.			£	s.	d.	£	s.	d.
Mar.	3rd.	J. S. Harding, jun., for payment of weekly salaries			-	15	5	0
,,	7th.	Le Grand and Sutcliff, apparatus for water at Valencia			-	13	5	6
,,	,,	Paris M. O., telegrams*			-	4	0	10
,,	10th.	J. S. Harding, jun., for payment of weekly salaries			-	15	5	0
,,	17th.	,, ,,			-	15	5	0
,,	21st.	Postmaster General, telegrams and private wire			-	221	7	1
,,	24th.	J. S. Harding, jun., for payment of weekly salaries			-	15	5	0
,,	31st.	General R. Strachey, R.E., salary	290	12	6			
,,	,,	A. Buchan, fees	44	13	11			
,,	,,	Professor G. H. Darwin, fees	162	9	1			
,,	,,	F. Galton, ,,	135	3	8			
,,	,,	Professor G. G. Stokes, ,,	85	0	6			
,,	,,	E. J. Stone, ,,	157	0	0			
,,	,,	Captain W. J. L. Wharton, R.N., fees	92	1	11			
,,	,,	E. Davis, Council, income tax	29	3	4			
,,	,,	J. S. Harding, jun., Council, petty expenses	3	15	1			
						1,000	0	0
,,	,,	R. H. Scott, Secretary			-	66	13	4
,,	,,	J. S. Harding, jun. - Office salaries			-	27	15	6
,,	,,	T. D. Bell - Office salaries			-	15	16	8
,,	,,	J. Sheerman, salary (harmonic analysis)			-	10	16	8
,,	,,	J. E. Cullum, salary (Valencia Observatory)			-	18	15	0
,,	,,	R. H. Curtis - Salaries (discussion, &c. of observations).				22	18	4
,,	,,	J. A. Curtis - Salaries (discussion, &c. of observations).				18	6	8
,,	,,	T. E. Allen - Salaries (discussion, &c. of observations).				16	13	4
,,	,,	C. H. Thompson - Salaries (discussion, &c. of observations).				12	10	0
,,	,,	S. Call - Salaries (discussion, &c. of observations).				11	13	4
,,	,,	R. G. Canham - Salaries (discussion, &c. of observations).				7	10	0
,,	,,	A. H. Bell - Salaries (discussion, &c. of observations).				7	10	0
,,	,,	L. H. Powers - Salaries (discussion, &c. of observations).				4	11	8
,,	,,	F. Gaster - Salaries (preparation, &c. of weather reports).				25	15	7
,,	,,	F. J. Brodie - Salaries (preparation, &c. of weather reports).				18	5	7
,,	,,	G. G. Francis - Salaries (preparation, &c. of weather reports).				17	16	3
,,	,,	A. J. Rigby - Salaries (preparation, &c. of weather reports).				17	6	10
,,	,,	R. Sargeant - Salaries (preparation, &c. of weather reports).				12	3	9
,,	,,	A. R. Simpkins - Salaries (preparation, &c. of weather reports).				10	6	3
,,	,,	C. W. Heinemann - Salaries (preparation, &c. of weather reports).				5	0	0
,,	,,	Capt. H. Toynbee - Salaries (discussion, &c. of observations and care of instruments).				33	6	8
,,	,,	Nav.-Lt. C. W. Baillie, R.N. - Salaries (discussion, &c. of observations and care of instruments).				22	18	4
,,	,,	R. Strachan - Salaries (discussion, &c. of observations and care of instruments).				27	15	6
,,	,,	C. Harding - Salaries (discussion, &c. of observations and care of instruments).				22	18	4
,,	,,	H. Harries - Salaries (discussion, &c. of observations and care of instruments).				15	0	0
,,	,,	W. Allingham - Salaries (discussion, &c. of observations and care of instruments).				15	0	0
,,	,,	W. G. James - Salaries (discussion, &c. of observations and care of instruments).				11	5	0
,,	,,	F. T. Bullen - Salaries (discussion, &c. of observations and care of instruments).				9	3	4
,,	,,	R. F. Wallace - Salaries (discussion, &c. of observations and care of instruments).				8	15	0
,,	,,	J. S. Harding, jun., for payment of weekly salaries			-	15	5	0
,,	,,	G. J. Mayhew, rent	158	15	0			
,,	,,	Pall Mall Coal Co., coals	5	5	0			
						164	0	0
,,	,,	General Life and Fire Assurance Co.	1	6	0			
,,	,,	,, ,,	1	2	0			
						2	8	0
,,	,,	Williams and Norgate, books			-	2	15	11
,,	,,	J. S. Harding, senr., pension			-	10	14	1
		Carried forward			-	£2,009	3	4

* Paid by draft on a foreign banker.

			£	s.	d.	£	s.	d.
1888.		Brought forward -	-		-	2,009	3	4
Mar.	31st.	H. Williams, care of bridled anemometer - - -	2	10	11			
,,	,,	,, care of Robinson's anemometer - -	2	11	2			
						5	2	1
,,	,,	Cambridge Scientific Instrument Co., adding machine -				3	12	6
,,	,,	C. Niven, Aberdeen Observatory -	68	10	8			
,,	,,	J. L. E. Dreyer, Armagh ,, - -	12	10	0			
,,	,,	W. L. Fox, Falmouth ,, - -	63	6	6			
,,	,,	Fleetwood Improvement Commissioners, care of anemometer - - -	2	10	9			
,,	,,	R. Grant, Glasgow observatory - -	18	9	3			
,,	,,	Kew Committee, allowance for quarter -	100	0	0			
,,	,,	W. Harrison, care of N. Shields anemometer	2	10	10			
,,	,,	W. I. Fortescue, care of Orkney ,,	2	10	0			
,,	,,	S. J. Perry, Stonyhurst observatory -	13	19	4			
,,	,,	J. E. Cullum, Valencia ,, -	13	8	8			
						297	16	0
,,	,,	G. T. Watson, care of Yarmouth anemometer - - -	3	18	6			
,,	,,	,, meteorological reports -	4	12	6			
						8	11	0
,,	,,	Scottish Meteorological Society, copies of observations -	39	17	0			
,,	,,	,, ,, ,, Ben Nevis observations -	100	0	0			
						139	17	0
,,	,,	H. Todd, Cambridge - - -	4	11	0			
,,	,,	H. Mohn, Christiania - - -	5	10	0			
,,	,,	P. Curnow, Dungeness - - -	4	11	5			
,,	,,	W. Brand, Dunrossness - - -	3	18	5			
,,	,,	W. H. Bunce, Hawes Junction - -	1	19	3			
,,	,,	S. Richards, Holyhead - - -	3	18	4			
,,	,,	G. G. Appleton, Hurst Castle - -	3	18	8			
,,	,,	J. Fisher, Jersey - - -	4	0	6			
,,	,,	F. Gaster, London - - -	3	18	0			
,,	,,	W. Berridge, Loughborough - -	3	5	7			
,,	,,	Secretary of Lloyd's, for Malin Head -	4	17	6			
,,	,,	K. Kerr, Mullaghmore - - -	5	4	8			
,,	,,	A. Penny, Nairn - - -	4	5	0			
,,	,,	W. Wickham, Oxford - - -	3	12	6			
,,	,,	O. Boeddicker, Parsonstown - -	3	5	0			
,,	,,	W. Hewitt, Prawle Point - -	3	5	0			
,,	,,	S. Blake, St. Ann's Head - -	3	7	0			
,,	,,	W. Thomas, Scilly - - -	6	12	6			
,,	,,	J. B. Smith, Spurn Head - -	3	6	3			
,,	,,	J. Forbes, Stornoway - - -	5	12	9			
,,	,,	J. Sinclair, Wick - - -	3	5	0			
,,	,,	F. Guy, York - - - - -	3	18	0			
						90	2	4
,,	,,	A. Buchan, salary - - -	37	10	0			
,,	,,	W. C. Ley, ,, - - -	37	10	0			
						75	0	0
,,	,,	J. R. Jones, Aberdeen agent - -	2	0	1			
,,	,,	J. Fowler, Cardiff agent - - -	3	12	10			
,,	,,	L. Allen, Dundee agent - - -	2	16	6			
,,	,,	D. McGregor & Co., Glasgow agents -	2	10	0			
,,	,,	J. Gill, Liverpool agent - - -	13	2	11			
,,	,,	C. H. Permain, Southampton agent -	2	5	3			
						26	7	7
		Carried forward -	-		-	2,655	11	10

		£	s.	d.
1888.	Brought forward - - -	2,655	11	10
Mar. 31st.	R. W. Munro, fitting for anemograph - - -	7	2	7
„ „	F. Gaster, for payment of allowances for extra attendance - - - - - - -	18	2	8
„ „	J. A. Curtis, for payment of accounts for reduction of old observations - - - - -	18	10	0
„ „	C. Harding, for payment of accounts for extraction of observations for Utrecht - - - -	16	7	8
„ „	J. S. Harding, jun., petty cash - - - -	40	0	0
„ „	Postmaster General, telegrams - - - -	125	0	0
		£2,880	14	9

116, *Victoria Street, May* 2, 1888.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (April 11) were read and confirmed.

Read—The following letter (Minutes, p. 2):—

6873/88.
(M.O. 914.)

SIR, Treasury Chambers, April 24, 1888.

I AM directed by the Lords Commissioners of Her Majesty's Treasury to acknowledge the receipt of your letter of the 19th instant, forwarding copy of a communication recently addressed by the Meteorological Council to the Directors of the Ben Nevis Observatory, N.B, notifying the conditions on which the Council are prepared to give financial assistance to the new Observatory about to be established at Fort William; and I am to express the satisfaction of this Board at learning that it has been found possible to meet the views of the Scottish Meteorological Society.

I am, &c.
(Signed) W. L. JACKSON.

The Secretary, Meteorological Office,
116, Victoria Street, London, S.W.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 14 logs had been received, 12 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. A. W. Adamson.	S.S. "Kaisar-i-Hind."	Jan. 26—April 25, 1888.	London, Calcutta, and home.	1887, p. 32.
J. C. Long (Sub-Lieut., R.N.R.)				—
Capt. D. Wilson-Barker.	S.S. "International."	Oct. 28, 1887—April 9, 1888.	London, Massowah, and home.	1886, p. 91.
Capt. James Buchan	Barque "Oban Bay."	Jan. 6, 1887—April 9, 1888.	Middlesbro', Monte Video, Esquimault, Portland (Oregon), and home.	1886, p. 64.
Capt. Robert Campbell.	S.S. "Elton" -	Jan. 8—April 24, 1888.	Middlesbro', India, and home.	—
Capt. Crowley -	Barque "Alexander Lawrence."	Jan. 19, 1887—April 18, 1888.	Glasgow, Sydney (N.S.W.), Wilmington (Cal.), Portland (Oregon), and home.	1886, p. 17.
Capt. J. Ivor Dunbar	S.S. "Arracan"	Dec. 24, 1887—April 4, 1888.	Liverpool, Rangoon, and home.	1887, p. 95.
Capt. H. W. Dyke -	"Accrington" -	Oct. 12, 1885—April 2, 1888.	Queenstown, Calcutta, Mauritius, Calcutta, New York.	1884, p. 112.
Capt. W. Hird -	"Marlborough"	Aug. 25, 1887—April 16, 1888.	London, Wellington -	1887, p. 16.
Capt. Alex. Ritchie	"Four Winds"	June 13, 1887—April 12, 1888.	Liverpool, Calcutta, and home.	—
Capt. C. J. Russell -	"Khyber" -	July 31, 1887—April 9, 1888.	Liverpool, Calcutta, and home.	1887, p. 37.
Capt. S. Trott -	S.S. "Minia" -	Nov. 1, 1887—April 10, 1888.	N. Atlantic Cableground	1887, p. 85.
Capt. W. Wilson -	Barque "Horsa"	Feb. 14, 1887—Jan. 3, 1888.	Melbourne, W. coast of S. America, and home.	1886, p. 65.

Mr. Scott was instructed to present the Charts (O. 32) to Captain Campbell and Mr. Long, (O. 43) to Captain Ritchie, and to convey the best thanks of the Council to the other observers.

Submitted—The following Report on the forecasts for April 1888 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

APRIL.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	30	54	42	72
"	b	39	21	30	
"	c	22	17	20	
"	d	9	8	8	
Scotland, E.	a	39	50	45	73
"	b	31	25	28	
"	c	30	13	21	
"	d	0	12	6	
England, N.E.	a	38	56	47	78
"	b	37	24	31	
"	c	21	8	14	
"	d	4	12	8	
England, E.	a	52	52	52	80
"	b	36	20	28	
"	c	12	16	14	
"	d	0	12	6	
Midland Cos.	a	64	52	58	88
"	b	32	28	30	
"	c	4	12	8	
"	d	0	8	4	
England, S.	a	64	56	60	88
"	b	32	24	28	
"	c	4	4	4	
"	d	0	16	8	
Scotland, W.	a	46	29	38	71
"	b	29	38	33	
"	c	21	17	19	
"	d	4	16	10	
England, N.W.	a	58	46	52	82
"	b	21	38	30	
"	c	21	8	14	
"	d	0	8	4	
England, S.W.	a	52	54	53	88
"	b	40	29	35	
"	c	8	9	8	
"	d	0	8	4	
Ireland, N.	a	52	54	53	80
"	b	28	25	27	
"	c	16	13	14	
"	d	4	8	6	
Ireland, S.	a	52	54	53	80
"	b	24	29	27	
"	c	16	4	10	
"	d	8	13	10	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	48	69	59	85
"	b	31	21	26	
"	c	17	7	12	
"	d	4	3	3	
Scotland, E.	a	55	48	52	74
"	b	14	31	22	
"	c	31	11	21	
"	d	0	10	5	
England, N.E.	a	57	47	52	85
"	b	33	33	33	
"	c	10	17	14	
"	d	0	3	1	
England, E.	a	53	44	49	87
"	b	37	40	38	
"	c	10	13	12	
"	d	0	3	1	
Midland Cos.	a	57	44	51	94
"	b	37	50	43	
"	c	3	3	3	
"	d	3	3	3	
England, S.	a	50	57	54	90
"	b	43	30	36	
"	c	0	10	5	
"	d	7	3	5	
Scotland, W.	a	37	27	32	69
"	b	40	33	37	
"	c	20	27	23	
"	d	3	13	8	
England, N.W.	a	47	44	46	84
"	b	43	33	38	
"	c	7	13	10	
"	d	3	10	6	
England, S.W.	a	50	50	50	89
"	b	40	37	39	
"	c	7	7	7	
"	d	3	6	4	
Ireland, N.	a	44	40	42	81
"	b	43	34	39	
"	c	10	13	11	
"	d	3	13	8	
Ireland, S.	a	47	47	47	85
"	b	43	33	38	
"	c	7	13	10	
"	d	3	7	5	

SUMMARY.

British Isles	a	50	51	51	80
"	b	31	27	29	
"	c	16	11	13	
"	d	3	11	7	
British Isles	a	49	47	48	84
"	b	37	34	36	
"	c	11	12	11	
"	d	3	7	5	

Submitted—The following statement of accounts for the year ending 31st March 1888:—

Income.	£ s. d.	£ s. d.	Expenditure.	£ s. d.	£ s. d.
Balance from year 1886–87	- - -	2,022 15 7	Administration:		
Vote for year - -	- - -	15,300 0 0	Payment of Council -	1,000 0 0	
Repayment of expenses charged under—			Secretary - -	800 0 0	
(1.) Incidental expenses -	10 9 4		Salaries and wages -	806 15 6	
(2.) Special researches	12 6 0		Rent, fuel, and lighting	738 17 10	
(3.) Observatories -	2 5 2		Furniture and fittings	98 4 8	
		25 0 6	Incidental and contingent expenses -	356 12 9	
			Pensions - -	42 16 4	
					3,843 7 1
Supply of Weather Information:			Special Researches*	- - -	746 17 10
D.W. Charts and Forecasts - - -	249 8 4				
6 p.m. Charts - -	25 0 0		Land Meteorology:		
Information for Press Agencies, &c. -	102 9 11		Observatories and stations - -	1,843 18 0	
Telegrams - - -	244 8 0		Discussion and reduction of observations -	1,299 18 0	
		621 6 3			3,143 16 0
Sale of Instruments, &c.:			Weather Information and Forecasts:		
Royal Navy account -	3 8 0		Telegraphic reports and storm warnings	2,891 8 5	
Mercantile Marine account - -	15 19 9		Preparation and issue of reports and forecasts - -	1,659 13 3	
		19 7 9			4,551 1 8
Commission charged on work done for Colonies, &c. - -	- - -	7 2 2	Inspections:		
			Salaries and travelling*	- - -	524 10 4
			Ocean Meteorology:		
			Discussion and reduction of observations -	1,884 6 0	
			Expenses incidental to the supply of instruments:		
			Proportion for care and issue of instruments -	200 0 0	
			Royal Navy -	184 9 10	
			Mercantile Marine	230 6 10	
			Distant island and coast stations -	37 9 7	
					2,536 12 3
			Balance - -	- - -	2,649 7 1
		£17,995 12 3			£17,995 12 3

Liabilities.	£ s. d.	Assets.	£ s. d.
To outstanding accounts or work uncompleted - - - -	96 10 9	By cash at Bank - - -	2,983 9 6
„ Post Office (estimated) - -	260 0 0	„ „ at Office - - -	67 15 5
„ sundry creditors - - -	219 6 8	„ sundry debtors - - -	263 19 7
„ balance - - - -	2,649 7 1		
	£3,225 4 6		£3,225 4 6

* Some expenses under these heads not yet brought to account.

Submitted—The first draft of the Report for 1887–88. The consideration of it was deferred to next meeting.

Mr. Scott reported that he had learnt that Mr. W. H. Dines, B.A., was engaged on some experiments on anemometers by the use of whirling machines, and that he (Mr. Scott) had consulted him as to the possibility of his testing the bridled anemometer with a view of determining a scale for interpretation of its indications. Mr. Scott was able to say that Professor Stokes approved of the proposal. Mr. Scott was authorised to communicate with Mr. Dines as suggested, and report to the Council.

Submitted the following :—

List of Storm Warnings issued to the Coasts of the British Islands since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result,—as to the Character of the Warning.

1. Warnings issued.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result.* Character of Warning.
1888.				
April 12th, 7.10 p.m.	Scotland, E.	South cone	Moderate to fresh Sly. gales, on 13th.	A
„ „	Ireland, S.	North cone	Strong S.Wly. wind, on 13th	B
„ „	„ E.	„	Strong Wly. wind, on 13th	B
„ „	Scotland, W.	„	„ „	B
„ „	England, N.W.	„	„ „	B
„ „	„ W.	„	Neither gales nor strong winds	C
	The depression on reaching the north-east of Scotland filled up quickly.			
April 16th, 7.40 p.m.	Ireland, S.	South cone	Neither gales nor strong winds	C
„ „	„ E.	„	Moderate S.Wly. gale, night of 16th	B
„ „	England, W. (Bristol Channel only).	„	Neither gales nor strong winds	C
„ „	„ S.W.	„	„ „ „	C
April 20th, 10 a.m.	Ireland, S. (except Galway).	North cone	Moderate N.Wly. gale, on 20th	B
„ „	„ E.	„	Fresh N.Ely. gale, night of 20th	A
„ „	Scotland, E.	„	Moderate to fresh N.Ely. gales, 20th	A
„ „	„ W.†	„	Strong N.Ely. winds, on 20th	B
„ „	England, W.†(Bristol Channel only).	„	Neither gales nor strong winds	C
„ „	„ S.W.	„	Fresh N.Wly. gale, on 20th	A
„ 0.30 p.m.	„ N.W.	„	Neither gales nor strong winds	C
„ „	„ W. (Aberystwith).	„	„ „ „	C
„ „	„ E. (northern part).	„	Moderate N.Ely. gale, on night of 20th.	B
„ 7 p.m.	„ E. (southern part).	„	Neither gales nor strong winds	C
April 21st, 7.30 p.m.	Ireland, S.	North cone	Neither gales nor strong winds	C
„ „	England, W. (Bristol Channel only).	„	„ „ „	C
„ „	„ S.W.	„	Strong N.E. winds, on 22nd	B
„ „	„ S.	„	Neither gales nor strong winds	C
„ „	„ S.E.	„	„ „ „	C
April 22nd, 9.30 p.m.	Ireland, E.	North cone	Strong Ely. winds, night of 22nd	B
„ „	England, N.W.	„	Neither gales nor strong winds	C
„ „	„ W. (excepting Bristol Channel).	„	„ „ „	C
„ „	„ E. (northern part).	„	„ „ „	C

* A = complete success (*i.e.* justified by gales of force 8 or more by Beaufort's scale).
B = partial „ („ „ winds „ 6 or 7 „).
C = failure „ („ not justified by either gales or strong winds).

† Information at present available from these coasts insufficient to give very reliable results.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result. — Character of Warning.
1888. April 22nd, 7.30 a.m. -	England, E. (southern part).	North cone	Strong N.Ely. winds, morning of 23rd.	B
	I do not see how it was possible to avoid warning *by far the greater part* of the above coasts, at all events, nor do I see why it was there was not more wind experienced considering the conditions which prevailed at 8 a.m. on 22nd.			
April 27th, 11.25 a.m.	Scotland, E. - -	North cone	Fresh N.Wly. gale, on 27th -	A
„ „ -	„ W.† -	„	Neither gales nor strong winds -	C
„ „ -	England, E.(northern part).†	„	„ „ „ -	C
April 28th, 7 p.m. -	Ireland, S. - -	South cone	Fresh Sly. gale, on 30th - -	A
„ „ -	„ E.† -	„	Strong S.Wly. winds, on 29th -	B
„ „ -	Scotland, W. -	„	Moderate gale from S.W., night of 28th.	B
„ „ -	England, N.W.† -	„	Moderate gale from S.W., night of 29th.	B
„ „ -	„ W. -	„	Strong S.Wly. winds, on 29th -	B
„ „ -	„ S.W. -	„	Fresh Sly. gale, on 30th - -	A
„ „ -	„ S. -	„	Strong S.Wly. winds, on 29th -	B
„ „ -	„ S.E. -	„	„ „ „ -	B

† Information at present available for these coasts insufficient to give reliable results.

SUMMARY.

A - - - - - - - = 7
B - - - - - - - = 17
C - - - - - - - = 17

2. GALES EXPERIENCED BUT NOT WARNED FOR.—None.

Telegraphic Branch,
2nd May 1888.

(Signed) FREDC. GASTER.

Submitted—The following statements of work during April 1888:—

MARINE ROOM.

May 1, 1888.

Examined 12 new logs and 2 lighthouse registers.

North Atlantic Weather Charts.

Proofs of lithographed charts received to September 3, 1883 (concluding the series). Sheets examined and passed for press to August 10, and the sheet for September 1–3 sent for revise.

General.

Preparation of the charts for the discussion of the cyclones in the Arabian Sea in May and June, 1885.

Discussion of sea and harbour data in the Red Sea from Office and Admiralty logs, and preparing monthly mean results of barometer, air temperature, and wind for Mr. Buchan.

Preparing for reduction by photolithography the chart of Magnetic Variation for 1880 over the globe for issue in "Instructions to Observers."

Dr. Meldrum's charts showing the tracks of cyclones in the Indian Ocean between 1856 and 1886copied on to enlarged monthly charts.

Charting currents for all oceans.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.
(To 30th April 1888.)

3 May, 1888.

Monthly Weather Report:—
1887, *March* issued, *April* quite ready—waiting for lithographs. *May* in hand. Later months as before.
1888, *January* nearly completed. *February* and *March*, tables, charts, &c. prepared.
Weekly Weather Report:—Issued to date. *Appendix I.* (Quarterly Summary) Part I.—Issued, Other Appendices well up to date.

Daily Weather Report.—Issued to date. Monthly summary, correction &c. for March.—Issued.
Checking of Daily (3.30 *p.m. and* 8.30 *p.m.*) *Forecasts.*—Done to date.
Checking of Storm Warnings recently issued.—Done to date.
Checking of Storm Warnings for 1887.—Commenced and about 3 months done.
Plotting Daily Weather Telegrams from the United States.—Done almost to date.
Investigation as to Prevalence of Fog over British Islands.—In abeyance, till checking of Storm Warnings, 1887, is completed.
Revising Appendices, &c. for Annual Report of Meteorological Council, 1888.—Done.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

May 1, 1888.

Observatory Returns.—The calculation of means, and the copying of Hourly Readings, completed to end of September and sent to printer. Proof has been revised and sent for press up to the end of August 1885. The means for October are now in hand.

Quarterly Weather Report.—The whole of the letterpress, tables, and plates for Part III., 1879, completed and sent to printers. The tables for Part IV. have been begun.

Harmonic Analyser.—The analysis of the barograms for 1879 completed, and the curves for 1880 commenced. Several experimental curves have been drawn and analysed for Mr. Buchan: Mr. Thompson has done the greater part of this work.

Miscellaneous.—The Bunhill Row Sunshine Cards for January–March 1888 tabulated for the Royal Meteorological Society.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

May 1, 1888.

Examinations.

May, 1886.—Completed.
June, 1886.—*Thermograms.*
January to March.—Partial examination of the Valencia work for the Registrar-General of Ireland.
Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

May, 1886:—*Notes of Errors* to Aberdeen, Armagh (*anemograms*), Falmouth, Kew (*anemograms*), and Valencia, and reports thereon to Council.
Investigations *re* the Beckley and check gauges at Falmouth and Valencia.

Miscellaneous.

Mr. Call was absent on sick leave from the 10th 25th ultimo, and the Easter vacation occurred during the period under notice.

(Signed) T. E. ALLEN.

The increments to the "classified" clerks, referred to on Minutes, 1884–5, pp. 118–9, were allowed; the salaries which are changed for the current year are the following (see Minutes, 1886–7, pp. 98, and 1887–8, pp. 5 and 6):—

CLASS I.—Maximum £275.

	Salary in 1888–89. £	s.	d.
J. A. Curtis	225	0	0
J. E. Cullum	230	0	0

CLASS II.—Maximum £200.

F. J. Brodie	200	0	0
G. G. Francis	195	0	0
T. D. Bell	195	0	0
A. J. Rigby	190	0	0
H. Harries	185	0	0
W. Allingham	185	0	0

	Salary in 1888–89. £	s.	d.
Class III.—Maximum £150.			
S. Call	145	0	0
W. G. James	140	0	0
R. Sargeant	135	0	0
J. Sheerman	135	0	0
Class IV.—Maximum £110.			
R. F. Wallace	110	0	0
A. H. Bell	95	0	0
R. G. Canham	95	0	0
C. W. Heinemann	65	0	0

In the case of the unclassified clerks, the following alterations were made, to date from the 2nd April :—

		s.	d.			
C. A. Bracey to receive weekly	+	1	6	1	0	0
H. G. Brown ,,	+	2	0	0	18	0
A. E. Pycock ,,	+	1	6	1	0	0
C. Pycock ,,	+	1	6	0	17	6
F. E. Dash ,,	+	1	0	0	11	0

The following arrangements were authorized to be made for improving the position of the ladies employed in the Marine Branch :—

Miss Anderson to receive an increase of 2*s.* 6*d.* per week yearly till salary rises 2*l.* per week.

Miss Harris to receive 2*s.* weekly each year till she reaches 1*l.* 10*s.* per week.

Miss Baird also 2*s.* weekly till her salary reaches 1*l.* 10*s.* per week.

To be subject in all cases to satisfactory reports being received of work done.

Reported—That the following cheques had been drawn during April 1888 :—

1888.		£	s.	d.
April 7th.	J. S. Harding, jun., for payment of weekly salaries	15	5	0
,, 9th.	Paris M.O., U.S. telegrams	*14	10	10
,, 11th.	G. A. Gillett, wood, oil, &c.	4	16	11
,, ,,	J. O'Driscoll, coals, &c., Valencia Observatory	4	10	9
,, ,,	Kew Committee, verification of instruments	25	14	0
,, ,,	Negretti & Zambra, instruments and repairs	47	10	11
,, 14th.	J. S. Harding, jun., for payment of weekly salaries	15	5	0
,, 21st.	,, ,, ,,	15	5	0
,, 23rd.	Paris M.O., telegrams	*4	5	7
,, ,,	Hamburg M.O., telegrams	*17	14	4
,, 28th.	J. S. Harding, jun., for payment of weekly salaries	15	5	0
,, ,,	R. H. Scott, Secretary	66	13	4
,, ,,	J. S. Harding } Office salaries	27	15	6
,, ,,	T. D. Bell } Office salaries	15	16	8
,, ,,	J. Sheerman, salary, harmonic analysis	10	16	8
,, ,,	J. E. Cullum, salary (Valencia Observatory)	18	15	0
,, ,,	R. H. Curtis } Salaries (discussion, &c. of observations)	22	18	4
,, ,,	J. A. Curtis } Salaries (discussion, &c. of observations)	18	6	8
,, ,,	T. E. Allen } Salaries (discussion, &c. of observations)	16	13	4
,, ,,	C. H. Thompson } Salaries (discussion, &c. of observations)	12	10	0
,, ,,	S. Call } Salaries (discussion, &c. of observations)	11	13	4
,, ,,	R. G. Canham } Salaries (discussion, &c. of observations)	7	10	0
,, ,,	A. H. Bell } Salaries (discussion, &c. of observations)	7	10	0
,, ,,	L. H. Powers } Salaries (discussion, &c. of observations)	4	11	8
,, ,,	F. Gaster } Salaries (preparation, &c. of Weather Reports)	25	15	7
,, ,,	F. J. Brodie } Salaries (preparation, &c. of Weather Reports)	18	5	7
,, ,,	G. G. Francis } Salaries (preparation, &c. of Weather Reports)	17	16	3
,, ,,	A. J. Rigby } Salaries (preparation, &c. of Weather Reports)	17	6	10
,, ,,	R. Sargeant } Salaries (preparation, &c. of Weather Reports)	12	3	9
,, ,,	A. R. Simpkins } Salaries (preparation, &c. of Weather Reports)	10	6	3
,, ,,	C. W. Heinemann } Salaries (preparation, &c. of Weather Reports)	5	0	0
	Carried forward	£528	8	1

* Paid by draft on a foreign banker.

1888.			£	s.	d.
		Brought forward - - -	528	8	1
April 28th.	Capt. H. Toynbee - -	Salaries (discussion, &c. of observations, and care of instruments).	33	6	8
„ „	Nav.-Lieut. C. W. Baillie, R.N.		22	18	4
„ „	R. Strachan - - -		27	15	6
„ „	C. Harding - - -		22	18	4
„ „	H. Harries - - -		15	0	0
„ „	W. Allingham - -		15	0	0
„ „	W. G. James - - -		11	5	0
„ „	F. T. Bullen - - -		9	3	4
„ „	R. F. Wallace - -		8	15	0
„ 30th.	Gas Light and Coke Co., gas - - - -		7	8	4
„ „	Pall Mall Coal Co., coals - - - -		10	10	0
„ „	J. E. Cullum, expenses, Valencia Observatory - -		12	13	3
„ „	J. H. Woodstock, packing cases - - - -		2	17	0
„ „	J. S. Harding, jun., petty cash - - - -		50	0	0
„ „	C. Harding, for payment of accounts for extraction of observations for Utrecht M.O. - - -		18	1	3
„ „	F. Gaster, for payment of allowances for extra attendance - - - - - - -		17	13	11
„ „	Paris M.O., telegrams - - - - -		*7	8	1
			£821	2	1

* Paid by draft on a foreign banker.

116, *Victoria Street, May* 16, 1888.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN. | MR. GALTON.
PROFESSOR DARWIN. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 2) were read and confirmed.

The draft of Annual Report was further considered.

Read—Letter 1041 from Mr. Buchan accompanying Mr. Dickson's report on his inspection of some of the Fishery Barometers on the Fifeshire coast. Mr. Buchan was requested to inquire if the Council of the Scottish Meteorological Society would be disposed to undertake the general supervision of these instruments in Scotland, and aid this Office in its endeavours to render them more practically useful to the class which they were designed to benefit.

Mr. Scott reported that Mr. Abercromby was willing to undertake an inspection of the barometers on the English coast, on terms similar to those proposed to Mr. Dickson. Mr. Scott was authorized to request Mr. Abercromby to confer with the Chairman on the subject.

Read—Letter 986 from the Post Office, stating that the electric anemometer at Valencia was in working order, and Letter 1032 from Mr. Cullum, stating that it had again broken down. The Chairman informed the Council that Mr. Preece was likely to visit Valencia shortly, and had expressed a wish to look into this matter himself.

Mr. Scott submitted a series of small charts of the Atlantic, compiled from a discussion of the Atlantic Weather Charts, which had occupied his time for some months. These charts, 37 in number, exhibited the apparent origin and history of all the serious storms which had visited these Islands between August 1882 and August 1883 inclusive.

Mr. Scott was requested to prepare similar small charts for each individual storm track he had investigated, nearly 250 in number.

Submitted—A draft of an improved form of the Weekly Weather Report, prepared at the Chairman's suggestion by Mr. Gaster. This was approved, the change to be made with the volume for 1889.

Reported—That arrangements were in progress for the issue of Hay Harvest Forecasts as in late years.—Approved.

Read—A memorandum from Captain Toynbee reporting that since the last meeting four logs had been received, all of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Comr. A. C. Clarke, R.N. Lieut. C. E. Pritchard, R.N.	H.M.S. "Espiègle."	Sept. 23, 1887—Jan. 2, 1888.	Devonport to Coquimbo	1877, p. 35.
Comr. R. F. Hoskyn, R.N. Lieut. F. Bowden Smith, R.N.	H.M.S. "Myrmidon."	Nov. 1, 1887—Feb. 28, 1888.	Surveying on Australian station.	1887, p. 123.
Capt. Moses Parry, F.R. Met. Soc.	S.S. "Prydain"	Aug. 6, 1887—March 21, 1888.	Newport, Mediterranean, America, Odessa, &c.	1887, p. 48.
Capt. R. Peebles	Barque "Bracadale."	June 7, 1887—April 12, 1888.	Liverpool, Calcutta, and home.	1887, p. 16.

Mr. Scott was instructed to present the Charts (O. 43) to Commander Clarke, and to convey the best thanks of the Council to the other observers.

Submitted the following:—

List of Storm Warnings issued to the Coasts of the British Islands since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result, as to the Character of the Warning.

1. Warnings issued.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and Approximate Time of occurrence.	Result.* Character of Warning.
1888.				
April 30th, 7.0 p.m. -	Scotland, E. -	South cone	Moderate gales from Swd., on 1st and 2nd.	B
„ „ -	England, E.(northern part).	„	Moderate gale from S.W., night of 1st.	B
„ 7.10 p.m. -	Ireland, S. -	„	S., veering to N.W., fresh to strong gales, on 1st.	A
„ „ -	„ E. -	„	Moderate gales, S. to N.W., on 1st	B
„ „ -	Scotland, W. -	„	Fresh gale from Wwd., evening of 1st.	A
„ „ -	England, N.W. -	„	Moderate to fresh S.W. gales, evening 1st.	A
„ „ -	„ W. -	„	Moderate to fresh S.W. gales, 1st and 2nd.	A
„ „ -	„ S.W. -	„	Fresh gale from S.W., 1st and 2nd	A
„ „ -	„ S. (western part).	„	„ „ „ -	A
May 2nd, 9.50 a.m. -	England, S. (eastern part).	South cone	Fresh S.W. gales, afternoon and evening 2nd.	A
„ „ -	„ S.E. -	„	„ „ „ -	A
„ „ -	„ E. (southern part).	„	Moderate S.W. gale, afternoon and evening 2nd.	B
May 3rd, 10 a.m. -	Scotland, E. -	North cone	Fresh N.W. gales, afternoon and night 3rd.	A
„ „ -	England, E. (northern part).	South cone	Fresh Wly. gales, afternoon 3rd -	A
May 7th, 7.40 p.m. -	Scotland, E.(northern part).	South cone	Fresh W. to N.W. gales, on 8th -	A
„ „ -	„ W.† -	„	Strong winds on some parts of coast	? B

* A = complete success (*i.e.* justified by gales of force 8 or more by Beaufort's scale).
B = partial „ („ strong winds, force 6 or 7 „).
C = failure (*i.e.* not justified by either gales or strong winds).
† Information at present available for these coasts insufficient to give reliable results.

Summary.

A + B - - - - = 16
C - - - - = 0

2. Gales for which no Warning was issued.

There was a fresh to strong gale from N.W. in the extreme N.E. of Scotland on May 13th. The 6 p.m. observations of 12th gave no decided indication of its approach, and at 9 a.m. on the 13th it was too late to issue useful warnings. The gale was very local.

Fredc. Gaster.

Telegraphic Branch,
16th May 1888.

116, *Victoria Street, May* 30, 1888.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN. | MR. GALTON.

MR. STONE.

The Secretary was in attendance.

The Minutes of the last meeting (May 16) were read and confirmed.

Read—A letter No. 1098 from Professor Stokes suggesting a simple apparatus for some anemometrical testing experiments.—The matter was referred to Professor Darwin.

Read—Letter 1073 from Lloyd's, stating that they were re-organising their system of signal stations, and concluding as follows:—

(*Extract.*)

"I should be grateful to you if you would be so good as to move the Council of the Meteorological Office to allow me to be informed whether they would favour my Committee with any remarks as to the points where, for meteorological purposes, it would be desirable to establish signal stations, and in the second place, whether the Council would wish to enter into some broad and comprehensive plan by which Lloyd's signalmen should take and report meteorological observations for the purposes of the Meteorological Office.

(Signed) H. M. HOZIER."

Mr. Scott was instructed to prepare a map showing the positions of the stations referred to by Captain Hozier.

Read—A memorandum from Captain Toynbee reporting that since the last meeting six logs had been received, five of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. E. C. Bennett	"Thessalus" -	March 25, 1887—April 15, 1888.	To Sydney, San Francisco, and home.	1886, p. 125.
Capt. J. Gordon -	S.S. "City of Agra."	March 2—May 19, 1888.	Liverpool to Calcutta, and home, viâ Suez.	1887, p. 132.
Capt. J. W. Millican	Barque "Myrtle Holme."	Sept. 3, 1887—May 27, 1888.	Glasgow, Adelaide, Queenstown, Bordeaux, Liverpool.	1887, p. 37.
Capt. F. W. Powles	R.M.S. "Essequibo."	Feb. 19—May 19, 1888.	Southampton to West Indies, Colon, and home.	—
Capt. G. Scott -	"Hoghton Tower."	May 28, 1887—Feb. 15, 1888.	Liverpool to Chittagong and Mauritius.	1885, p. 83.

Mr. Scott was instructed to present the Charts (O. 32) to Captain Powles, and to convey the best thanks of the Council to the other observers.

Mr. Scott stated that Captain Bennett was about to retire from sea service, and as he had been observing for the Office for 17 years, he requested permission to present Captain Bennett with a barometer, as had been done in the case of Captain I. C. Gales in 1870.—Approved.

Reported that the following instruments were required for the Meteorological Office stock:—

B.T. LIST.

	£	s.	d.
200 thermometers, cost - - -	70	0	0
100 hydrometers, cost - - -	25	0	0
6 station barometers, cost - -	24	0	0
50 aneroids (A. account), cost - -	131	5	0

—Authority to order granted.

Reported that Commissionaire Forder had resigned, in order to go to Canada, and that Commissionaire Morgan had been appointed in his place at the salary of 1*l.* 1*s.* per week, from the 23rd May.

Submitted the following :—

List of Storm Warnings issued to the Coasts of the British Islands since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate Time of their occurrence), and the Result—as to the character of the Warning.

1. Warnings issued.

Day and Hour of Issue.	Coasts warned.	Signals hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result.* Character of Warning.
1888.				
May 15th, 10 a.m.	Ireland, S.	South cone	Moderate gales from S. and S.E., morning 16th.	B
„ „	„ E.	„	Neither gales nor strong winds	C
„ „	Scotland, W.	„	„ „ „	C
„ „	England, N.W. (northern part).	„	„ „ „	C
May 16th, 7.20 p.m.	England, S.W.	South cone	Moderate gales from S.W., on 17th	B
„ „	„ S. (western part).	„	Moderate to fresh from S.W., on 17th.	A
May 19th, 7.30 p.m.	Ireland, S.	South cone	Neither gales nor strong winds	C
„ „	England, W. (southern part).	„	„ „ „	C
„ „	„ S.W.	„	„ „ „	C
Signals were lowered next morning.				
May 29th, 3.50 p.m.	Ireland, S.	South cone	Moderate to fresh gales from Swd., night of 29th.	A
„ „	„ E.†	„	Apparently strong Sly. and S.Wly. winds, 30th.	B
„ „	Scotland, E.	„	Fresh to strong Sly. gales, night of 29th.	A
„ „	„ W.†	„	Apparently strong Sly. winds, night 29th.	B
„ „	England, N.W. (northern part).	„	Moderate S. to S.W. gales, on 30th	B
„ 7 p.m.	„ (southern part).	„	Moderate to strong S.Wly. gales, on 30th.	A
„ „	„ W.	„	Strong squally S.Wly. winds, on 30th.	B
„ „	„ S.W.	„	Moderate Sly. gales, night of 29th	B
„ „	„ S. (Channel Islands and Southampton).	„	„ „ on 30th	B
„ „	„ E. (northern part).	„	No increase of the strong winds	C

* A = complete success (*i.e.*, justified by gales of force 8 or more by Beaufort's scale).
B = partial „ („ strong winds, force 6 or 7, by Beaufort's scale).
C = failure (*i.e.*, not justified by either gales or strong winds).
† Information at present available for these coasts insufficient to give reliable results.

Summary.

A + B - - - - - -	12
C - - - - - -	7

2. Gales for which no Warning was issued.—None.

(Signed) Fredc. Gaster.

Telegraphic Branch,
30th May 1888.

116, *Victoria Street, June* 13, 1888.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. GALTON.
PROFESSOR DARWIN.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 30) were read and confirmed.

Read—The following correspondence :—

(M.O. 1177.)

Agricultural Department, Privy Council Office,
44, Parliament Street, Westminster, S.W.,
June 5, 1888.

SIR,

I AM directed by the Lords of the Committee of Council for Agriculture to transmit copy of a letter received from Mr. Charles Whitehead, the Agricultural Adviser to this Department, with reference to the remarks made by Colonel Nolan in the House of Commons, on the 1st instant, upon the subject of weather forecasts at the seasons of hay-making and harvest.

Adverting to the suggestions contained in Mr. Whitehead's letter, to the effect that the Meteorological Society might be asked to assist the Agricultural Department by distributing to farmers hay and harvest weather forecasts, and ensuring the further publicity of the information at all railway stations and post offices, I am to ask that you will have the goodness to bring the letter before the Society, and that I may be favoured with any observations they may have to make thereon.

I am, &c.
(Signed) C. L. PEEL.

The Secretary, Meteorological Council,
116, Victoria Street, S.W.

(M.O. 1177.)

Barming House, Maidstone,
June 2, 1888.

SIR,

I BEG to submit that there is a great deal in the remarks of Colonel Nolan, made in the House of Commons on Friday last, upon the subject of weather forecasts at the seasons of hay-making and harvest that is worth the consideration of the Agricultural Department.

I may say that I, together with about 30 others in England, Wales, Scotland, and Ireland, nominated by the Royal Agricultural Society, receive daily telegraphic forecasts of the weather during the hay harvest from the Meteorological Office, and that these forecasts are appreciated by farmers in a considerable degree.

In my own case, by the kind courtesy of the local station-master, the telegraphic forecasts are copied before they are delivered to me, and posted up in a conspicuous place at the railway station, and I believe that it might be easily arranged, if it were thought desirable by the Agricultural Department to supply weather forecasts to farmers, that station and post masters should place the telegrams in conspicuous places in their stations or post offices.

I am sure that the Meteorological Office would be only too glad to assist in every way the distribution of hay and harvest forecasts, as those sent to myself and 30 others are forwarded and delivered without any charge.

Should this be entertained by the Agricultural Department and facilities given by the authorities of the Post Office and railway companies, it would be well to commence with a few stations in central parts of each county, which could be added to if thought necessary.

I venture to add that the hay harvest will commence in 10 days or so, and that to be of any benefit this season steps must be taken at once.

I am, &c.
(Signed) CHARLES WHITEHEAD.

The Clerk of the Council,
&c. &c. &c.

P.C. 1222.
(M.O. 1777.)

Meteorological Office, June 6, 1888.

SIR,

I HAVE the honour to acknowledge receipt of your letter (No. 98,239), which shall be laid before the Meteorological Council.

In the meantime, perhaps, you will be good enough te inform me whether the Agricultural Department contemplates defraying the cost of disseminating the forecasts in question, as it has been several times stated in Parliament that this Office has no funds available for the purpose.

The cost of each telegram might be reduced to sixpence.

I am, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

The Clerk of the Council,
Agricultural Department, Privy Council Office,
44, Parliament Street, S.W.

Agricultural Department, Privy Council Office,
(M.O. 1208.) 44, Parliament Street, Westminster, S.W.,
SIR, June 9, 1888.

I AM directed by the Lords of the Committee of Council for Agriculture to acknowledge the receipt of your letter of the 6th instant, stating that my communication of the 5th instant will be laid before the Meteorological Council, and requesting that you may be informed whether the Agricultural Department contemplates defraying the cost of disseminating the forecasts in question, as the Meteorological Office has no funds available for the purpose.

In reply, I have to inform you that this Department likewise has at present no funds specially available for the object in view, but their Lordships would be glad to ascertain whether the Meteorological Department can furnish the Agricultural Department with an estimate of the probable cost of distribution of the telegrams conveying the information referred to in this correspondence to the various stations and post offices throughout the kingdom for exhibition thereat in the manner suggested by Mr. Whitehead.

I am, &c.
(Signed) C. L. PEEL.

The Secretary, Meteorological Council,
116, Victoria Street, S.W.

Mr. Scott reported that he had ascertained from the Post Office (Letter 1237) that the number of telegraph offices in the kingdom exceeded 6,600, so that if the idea of transmitting the forecasts at ordinary rates was to be entertained, the cost would be considerable.

The Chairman was requested to visit the Agricultural Department of the Privy Council and explain the position of the Office as regards the proposal made by Mr. Whitehead.

Read—The following letter (Minutes, p. 1) :—

BEN NEVIS OBSERVATORY.

(M.O. 1209.) Scottish Meteorological Society, 122, George Street,
SIR, Edinburgh, 5th June 1888.

I BEG to acknowledge receipt of your letter of March 22nd, 1888, with reference to the Ben Nevis Observatory and the low-level observatory which it is proposed to erect in connection with it at Fort William; and I am desired to convey the thanks of the Directors to the Meteorological Council for their offer, conditionally made, to supply and erect the self-registering and other meteorological instruments required at Fort William; to make an annual grant of 250*l.* towards the maintenance of this observatory; and to continue the grant of 100*l.* yearly towards the Ben Nevis Observatory.

I am to inform the Meteorological Council, however, that the Directors are not yet in a position to satisfy the conditions stated in your letter, inasmuch as they are not in possession of the funds required to build the observatory at Fort William. They have made application, which they have reason to hope will be favourably received, for a grant from the surplus funds of the Edinburgh International Exhibition, and the result of that application will probably be known in a few weeks. The Directors will then be in a position to consider the proposals of the Meteorological Council, together with any other proposals that may occur to the Directors in substitution or in modification of those explained in your letter.

I remain, &c.
(Signed) ARTHUR MITCHELL,
Hon. Secretary.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

Mr. Scott reported that he had forwarded a copy of the above letter to the Treasury (P.C. 1271).

Mr. Scott submitted a map showing positions of the stations proposed by Captain Hozier (Minutes, May 30). He was instructed to inform Captain Hozier that the Council do not at present contemplate increasing the number of stations reporting to them, but that they would be glad to learn from him of extensions of telegraphic lines to such places as the Butt of Lewis, and also to ascertain if Lloyd's receive reports *regularly* and *promptly* from Cape Finisterre (P.C. 1307).

The draft Report of the Office for the year 1887–8 (Minutes, p. 18) was adopted, subject to revision by the Chairman, and the Secretary was ordered to forward it to the Royal Society before the 21st instant (P.C. 1328).

Read—A letter from Mr. Eliot (Letter 1,184) stating that he was in correspondence with Her Majesty's Resident at Aden as to the proposed observations at Perim (Minutes, p. 4).

Mr. Scott was instructed to give further explanations as to the Current observations required (P.C. 1284).

Mr. Baillie submitted a specimen of one of his charts of Cape Guardafui, for the three months of the S.W. Monsoon, as mentioned in the last Report of the Office, and he was instructed to complete the charts, for submission to the Hydrographer.

Read—Letter 1,229 from the Royal Meteorological Society, inquiring if the Office would allow 25*l.*, as usual, towards the cost of their inspections.—Approved (P.C. 1301).

Read—A memorandum from Captain Toynbee reporting that since the last meeting six logs had been received, all of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. E. G. Bourke, R.N.	H.M.S. "Hyacinth."	April 1, 1887—March 31, 1888.	Pacific station - -	1883, p. 54.
Capt. J. G. Cameron	S.S. "Adriatic"	Nov. 10, 1887—June 6, 1888.	New York and home (6 voyages).	——
Capt. W. Ellery -	"Talookdar" and "Majestic."	Sept. 2, 1887—May 30, 1888.	Liverpool, Calcutta, and home.	1887, p. 48.
Capt. A. McLean -	S.S. "Concordia."	Oct. 25, 1887—May 10, 1888.	Glasgow to Montreal, 2 voyages. Glasgow to Baltimore, 2 voyages.	1887, p. 75.
Capt. G. Shearer -	Barque "Thetis"	Nov. 28, 1887—March 8, 1888.	Pisagua to Falmouth -	1886, p. 112.
Capt. W. Waring -	S.S. "Breconshire."	Jan. 22—June 4, 1888.	London, China, Japan, and home.	1887, p. 87.

Mr. Scott was instructed to present the Charts (O. 32) to Captain Cameron, and to convey the best thanks of the Council to the other observers.

Submitted—The following :—

LIST of STORM WARNINGS issued to the COASTS of the BRITISH ISLANDS since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result, as to the Character of the Warning.

(1.) WARNINGS ISSUED.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result.* — Character of Warning.
1888. June 2nd, 7.10 p.m. -	Scotland E. (northern part).	South cone	Moderate gale from S.E., early on 3rd.	B

* A = complete success (*i.e.* justified by gales of force 8 or more by Beaufort's scale).
B = partial success („ „ strong winds, forces 6 or 7 „).
C = failure („ not justified by either gales or strong winds).

(2.) GALES FOR WHICH NO WARNING WAS ISSUED.—None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
13th June 1888.

Submitted—The following report on the forecasts for May 1888 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

MAY.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	44	63	54	83
"	b	33	26	29	
"	c	19	7	13	
"	d	4	4	4	
Scotland, E.	a	37	63	50	82
"	b	37	26	32	
"	c	26	7	16	
"	d	0	4	2	
England, N.E.	a	56	56	56	90
"	b	26	41	34	
"	c	11	0	5	
"	d	7	3	5	
England, E.	a	48	70	59	93
"	b	48	19	34	
"	c	4	4	4	
"	d	0	7	3	
Midland Cos.	a	52	52	52	91
"	b	41	37	39	
"	c	7	0	4	
"	d	0	11	5	
England, S.	a	52	74	63	84
"	b	26	15	21	
"	c	22	4	13	
"	d	0	7	3	
Scotland, W.	a	30	52	41	76
"	b	48	22	35	
"	c	22	7	15	
"	d	0	19	9	
England, N.W.	a	44	67	56	89
"	b	37	30	33	
"	c	19	0	10	
"	d	0	3	1	
England, S.W.	a	48	67	58	86
"	b	41	15	28	
"	c	7	11	9	
"	d	4	7	5	
Ireland, N.	a	41	82	62	84
"	b	37	7	22	
"	c	19	11	15	
"	d	3	0	1	
Ireland, S.	a	37	59	48	78
"	b	37	22	30	
"	c	22	8	15	
"	d	4	11	7	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	42	58	50	78
"	b	26	29	28	
"	c	19	7	13	
"	d	13	6	9	
Scotland, E.	a	39	71	55	83
"	b	32	23	28	
"	c	23	3	13	
"	d	6	3	4	
England, N.E.	a	61	52	57	84
"	b	23	32	27	
"	c	10	6	8	
"	d	6	10	8	
England, E.	a	55	58	57	86
"	b	36	23	29	
"	c	6	6	6	
"	d	3	13	8	
Midland Cos.	a	52	55	54	86
"	b	39	26	32	
"	c	6	3	5	
"	d	3	16	9	
England, S.	a	52	58	55	88
"	b	39	26	33	
"	c	3	6	4	
"	d	6	10	8	
Scotland, W.	a	36	45	41	83
"	b	48	36	42	
"	c	13	3	8	
"	d	3	16	9	
England, N.W.	a	55	58	57	86
"	b	32	26	29	
"	c	13	6	9	
"	d	0	10	5	
England, S.W.	a	65	58	62	84
"	b	26	19	22	
"	c	6	13	10	
"	d	3	10	6	
Ireland, N.	a	49	58	54	83
"	b	29	29	29	
"	c	16	3	9	
"	d	6	10	8	
Ireland, S.	a	32	58	45	78
"	b	42	23	33	
"	c	20	6	13	
"	d	6	13	9	

SUMMARY.

British Isles	a	45	64	55	85
"	b	37	24	30	
"	c	16	5	11	
"	d	2	7	4	
British Isles	a	49	57	53	83
"	b	34	26	30	
"	c	12	6	9	
"	d	5	11	8	

Submitted—The following :—

RETURN of the RESULT of the COMPARISON between the WARNINGS ISSUED and the WEATHER EXPERIENCED in 1887.

Coasts.	Total No. of Orders to Hoist and Repetitions.	Warnings justified by Gales, Force 8 and upwards.	Warnings justified by subsequent Strong Winds, Forces 6 and 7.	Warnings not justified by subsequent Weather.	Warnings late, Force 8, reached at two Stations before issue.	Warnings partially late, Force 9, reached at one Station before issue.	Warnings in Error, owing to Telegraphic Mistakes.	Storms for which no Warning was issued.
Ireland, South -	58	32	12	12	—	1	1	Jan. 3.
„ East -	68	34	20	12	—	1	1	
Scotland, East -	62	37	13	11	—	1	—	
„ West -	52	25	18	8	—	1	—	Dec. 17.
England, North-west	57	42	5	8	—	1	1	Dec. 17.
„ West -	42	19	17	5	—	—	1	Dec. 6.
„ South-west	38	22	8	7	—	—	1	Dec. 6.
„ South -	34	19	10	5	—	—	—	March 31 ; April 6.
„ South-east -	29	15	12	2	—	—	—	April 6.
„ East -	32	17	8	7	—	—	—	
Totals - -	472	262	123	77	—	5	5	
Percentages -	—	55·5	26·1	16·4	—	1·0	1·0	

NOTES as to GALES in 1887 for which WARNINGS were not issued.

Gale of January 3, *in Ireland, S.*—This gale came on suddenly early on January 3, but at 6 p.m. on the 2nd, there was no indication of its approach.

Gale of March 31–*April* 1, *in England, S.*—This was a local extension of a northerly gale, which was felt on many parts of our coasts during the night of March 31–April 1. The other coasts were all duly warned, but there was no reason to suppose that the south coast would feel much of it, and in fact Hurst Castle and the Owers Lightship were the only stations which reported it as a strong gale.

Gale of April 6, *in England, S. and S.E.*—North-easterly winds were setting in on the evening of the 5th, and the northern and north-eastern parts of our Islands were warned. During the night, however, the barometer rose very quickly in the north, and as the change spread rapidly the gradients became steep in the south and south-east, and a gale set in before morning. This failure was unavoidable.

Gale of December 6, *in England, W. and S.W.*—A southerly and south-westerly gale, caused by the approach of a deep depression to the Hebrides during the night of December 5–6, and a "V"-shaped secondary to the Irish Sea. Of the advance of the latter which caused the gale in question, there was no indication at 6 p.m. 5th ; the more northern of our western coasts were duly warned.

Gale of December 17, *in Scotland, W. and England, N.W.*—A westerly gale. At 6 p.m. 16th, there was a large depression in the north, moving eastwards, and having slight gradients near its centre. A rapid rise of the barometer in the west and south-west during the night, caused an increase of the gradients on our north-western coasts, and hence the gale ; which, however, was duly warned for on the other coasts.

FREDERIC GASTER.

Submitted—The following statements of work during May 1888 :—

MARINE ROOM.

June 12, 1888.

Examined 15 new logs.

North Atlantic Weather Charts.

The charts have all been lithographed, and the proofs examined and passed for press. The whole of the work in connection with this discussion is now completed.

Preparing a chart showing the tracks of low-pressure systems in October 1882.

Preparing small charts for a series of tracks of disturbances crossing the Atlantic.

General.

Discussion of Red Sea data from Office and Admiralty logs.

Completing the preparation, for the lithographer, of a chart of Magnetic Variation.

Making additions to the form of the chart for the Indian Ocean Cyclone tracks.

Preparing Ocean Currents for charting by the female staff.
Indexing data in ocean 10° squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH (to 31st May 1888).

Monthly Weather Report:—

1887. *April.*—Issued. *May* to *December.*—As before.
1888. *January,* in type and revised, waiting for plates.
February, half done. *March* and *April.* Tables and rough plates prepared.

Weekly Weather Report, 1888:—

Numbers all issued promptly to date.
All Appendices in hand, and done well to date.

Daily Weather Report:—

Issued regularly, to date. Monthly Corrections and Additions sheet, and summary for April—Issued.
Checking Storm Warnings Issued 1887.—Done, and results handed in.
Checking Storm Warnings Issued 1888 (1st checking).—Done to date.
Checking Daily (3.30 p.m. and 8.30 p.m.) *Forecasts.*—Done to date.
Plotting of Daily Weather Telegrams from U.S.—Done to date.
Investigation as to Prevalence of Fog in British Isles.—As before.
Preparing (in rough) *New Chart for Weekly Weather Report,* 1889, and for *Working Chart* in daily use in Meteorological Office.—Done.
Preparing Maps showing Positions of all Daily and Weekly Weather Report Stations.—Done.
Preparing Map showing all Storm Signal Stations, Daily Weather Report Stations, and New Stations established by Lloyd's.—Done.
Quarterly Weather Report, 1879.—Tables of Means for October, November, and December.—Done and handed to Mr. Curtis.
Consideration of Question of Inspections, attending meeting of Inspectors, &c.—Took all available time on two days.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

June 1, 1887.

Observatory Returns.—Proof of Hourly Readings has been revised and signed for press to the end of September 1885, and Part III. for that year published. The calculation of the daily and other means, and of the Hourly Vapour Tension Values, has been completed for the months of October and November 1885.

Quarterly Weather Report.—Proofs of the letterpress, tables, and plates for Part III., 1879, have been twice revised and signed for press; the part has now been published. The tables for Part IV., 1879, are completed and the letterpress has been begun.

Harmonic Analyser.—The analysis of the barograms for 1880 has been completed for three of the seven observatories. Mr. Thompson was occupied during a few of the earlier days of the month in completing the work connected with the curves for Mr. Buchan.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

June 1, 1887.

Examinations.

June and *July* 1886.—Completed.
Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

June 1886:—*Notes of Errors* to Aberdeen, Armagh (*barographs*), Falmouth, Kew (*barograms*), and Valencia, and report thereon.

Miscellaneous.

Preparing form 24 (Barograph Journal) for printer.
I was absent on six and Mr. Call on two days during the month.

(Signed) T. E. ALLEN.

Reported—That the following cheques had been drawn during the month of May :—

1888.			£	s.	d.
May 2nd.	Spottiswoode and Co., private wire at Prawle Point	-	17	0	0
„ „	H.M. Postmaster General, telegrams - -	-	122	7	4
„ 5th.	J. S. Harding, junr., for payment of weekly salaries	-	15	5	0
„ 12th.	„ „ „	-	19	9	0
„ 19th.	„ „ „	-	15	19	0
„ 26th.	„ „ „	-	15	19	0
„ „	R. H. Scott - - - } Office salaries - -		66	13	4
„ „	J. S. Harding, junr. - - }		27	15	6
„ „	T. D. Bell - - - - - -		16	13	4
„ „	J. Sheerman, harmonic analysis - - - -		11	13	4
„ „	J. E. Cullum, salary (Valencia observatory) - -		19	11	8
„ „	R. H. Curtis - - -		22	18	4
„ „	J. A. Curtis - - -		19	3	4
„ „	T. E. Allen - - -		16	13	4
„ „	C. H. Thompson - -	Salaries (discussion,	12	10	0
„ „	S. Call - - -	&c. of observations).	12	10	0
„ „	R. G. Canham - -		8	6	8
„ „	A. H. Bell - - -		8	6	8
„ „	L. H. Powers - - -		4	11	8
„ „	F. Gaster - - -		25	15	7
„ „	F. J. Brodie - - -		19	4	5
„ „	G. G. Francis - - -	Salaries (preparation,	18	14	11
„ „	A. J. Rigby - - -	&c. of Weather	18	5	8
„ „	R. Sargeant - - -	Reports).	13	2	5
„ „	A. R. Simpkins - -		10	6	3
„ „	C. W. Heinemann - -		5	16	8
„ „	Capt. H. Toynbee - -		33	6	8
„ „	Nav.-Lieut. C. W. Baillie, R.N.		22	18	4
„ „	R. Strachan - - -		27	15	6
„ „	C. Harding - - -	Salaries (discussion,	22	18	4
„ „	H. Harries - - -	&c. of observations	15	16	8
„ „	W. Allingham - -	and care of instru-	15	16	8
„ „	W. G. James - - -	ments).	12	1	8
„ „	F. T. Bullen - - -		9	3	4
„ „	R. F. Wallace - - -		9	11	8
„ 31st.	Pall Mall Coal Company, coals - - - -		5	5	0
„ „	Bank of England; Stationery Office account - -		11	16	3
„ „	Wightman and Co., printing and wrappers - -		10	7	6
„ „	J. A. Curtis, for payment of accounts for discussion of old observations - - - - -		10	6	0
„ „	J. E. Cullum, expenses at Valencia - - -		14	3	8
„ „	H. M. Postmaster-General, telegrams - - -		139	4	4
„ „	F. Gaster, for payment of accounts for extra attendance -		16	12	9
„ „	H. N. Dickson, inspection of fishery barometers - -		7	8	11
„ „	W. C. Ley, balance of account for inspections, 1887 -		32	18	8
„ „	„ advance for inspection expenses, 1888 -		30	0	0
„ „	J. H. Woodstock, packing cases - - -		2	13	0
„ „	T. De La Rue & Co., sunshine cards - - -		6	6	0
„ „	C. Harding, for payment of accounts for work done for Utrecht M.O. - - - - -		18	11	0
„ „	J. S. Harding, jun., petty cash - - - -		50	0	0
			£1,089	14	4

Increment for two months' allowance on above salaries.

116, *Victoria Street, June* 27, 1888.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (June 13) were read and confirmed.

Read—Letter 1350 from the Treasury, asking for any suggestions the Council might wish to make in explanation of the estimate for the Office. The Chairman was requested to forward a reply (P.C. 1455).

Read—The following letter (Minutes, p. 18) :—

(M.O. 1351.) Scottish Meteorological Society, 122, George Street,
DEAR SIR, Edinburgh, June 26, 1888.

WITH reference to the conversation at the meeting on the 13th regarding the fishery barometers, I am desired by the Council of this Society to say that they will gladly undertake the inspection of these barometers for the year, beginning with July next, for a sum not exceeding 200*l.*, and that a Report of the inspection will be submitted to the Meteorological Council, together with a detailed statement of the expenses incurred.

Special attention will be given, by short lectures, conversations, and otherwise, to awaken an interest among the fishermen in weather forecasts, and instruct them more particularly how they may best turn their instruments to account in connexion with the storm warnings issued from the Office, in much the same way as was done in inspecting the seven stations near Edinburgh.

Faithfully yours,

R. H. Scott, Esq., (Signed) ALEXANDER BUCHAN.
Secretary, Meteorological Council.

The Secretary was instructed to accept the proposed arrangement (P.C. 1524).

Mr. Scott reported (Minutes, p. 18) that a letter (P.C. 1334) had been written to Mr. Abercromby, proposing that he should inspect the fishery barometers between Lynn and Wivenhoe (inclusive) on the same terms as those proposed for Mr. Dickson (Minutes, p. 4), and that Mr. Abercromby had accepted the proposal (Letter 1314).

Submitted—The following correspondence :—

DEAR MR. SCOTT, Lensfield Cottage, Cambridge, 24th May 1888.

THE correction for the wind in Mr. Dines' experiments involves the mean of the square of the wind's velocity, but we measure the wind by some form of anemometer, such as the cup, or the helicoidal anemometer, which gives the mean velocity. But the mean of the square must exceed the square of the mean unless the velocity is quite uniform.

I do not think it would be difficult or expensive to construct a simple kind of anemometer which would give the mean square for a suitably chosen time. It would not indeed be a rigorous mean square for a definite time, but something which would serve the same purpose. It would consist of two vessels, A, B, containing water, but only partially full. They might conveniently be of the form of cylinders with a common vertical axis, B being the interior, or they might be side by side. A and B communicate with each other only through a very narrow capillary tube, always under water. A is open to the air at top,—better perhaps partially sheltered from the wind by a cap of felt or other porous material. B communicates with a trumpet mouth, like what is used in steamers for ventilating the engine-room, and the whole is mounted on a vertical axis and is provided with a vane, so as to keep the mouth to the wind. It thus resembles a Hagemann's anemometer, only that I do not recollect how the retardation is effected in the latter. For my purpose it is essential that, to use two terms employed by Graham, it should be by transpiration, not effusion.

If h be the difference of level of the surface of the water in the vessels, t the time, c the velocity of the wind, and $f(t) = v^2$, then—

$$h = a\int_0^\infty c \quad f(t-\theta)\, d\theta.$$

It is perfectly easy to determine experimentally the constant b. The constant a is less easily determined, and I will not take up your or my time by mentioning the ways I have thought of.

The ratio of the mean square, as measured by such an instrument, to the square of the mean, the mean being measured by an ordinary anemometer, would give a sort of measure of the irregularity or gustiness of the wind. A gusty storm would be more likely to do damage than a steady gale of the same mean velocity.

Yours, &c.
(Signed) G. G. Stokes.

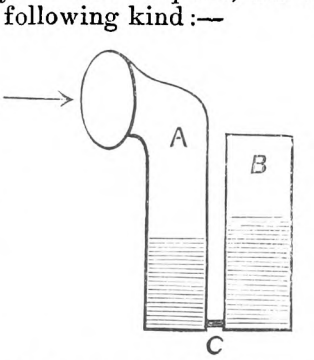
Memorandum on Professor Stokes's Letter.

This letter refers in the first instance to Mr. Dines's experiments on anemometers with a large whirling machine. These experiments have to be conducted in the open air, and it is practically impossible to wait for those rare days when there is no wind. The first sentence of the letter refers to the correction which has to be applied to the results for the existence of wind when the bridled anemometer is being tested. When the cup of an anemometer is constrained so that it does not yield to the wind, the constraint varies, at least approximately, as the square of the wind's velocity. If a be the radius of the whirler, and w its angular velocity, the apparent wind created by whirling in still air has a velocity wa; but if there is an actual wind of velocity u, it must be superposed on the apparent wind. Since relatively to the anemometer the true wind rotates with angular velocity w, the total apparent wind experienced by the cups, has a velocity $wa + u \cos wt$, where t is time. But the bridled anemometer determines the square of the velocity of the wind, which in this case is $w^2a^2 + \frac{1}{2}u^2 + \frac{1}{2}u\,wa \cos wt + \frac{1}{2}u^2 \cos 2wt$. Thus in a single revolution of the whirler there are two inequalities registered, one with single, the other with double periodicity. Therefore in a whirling experiment the mean velocity is $\sqrt{\left(w^2a^2 + \frac{1}{2}u^2\right)}$; that is to say, Mr. Dines's results have to be corrected by a term depending on the square of the true wind's velocity.

This leads Professor Stokes to reflect on the results which might be attained by instruments which, like the bridled anemometer, are designed to estimate "the velocity of mean square"* of the wind.

In other anemometers the arms of the instrument rotate as freely as possible, and the only work done is expended in overcoming friction and actuating the registering apparatus. With perfectly uniform wind and infinitesimal friction this class of instrument registers the velocity of wind, but with actual instruments a correction has to be applied for the moment of inertia of the revolving arms and for friction, and an approximation is obtained to the mean velocity of the wind. Professor Stokes then suggests an anemometer for recording velocity of mean square, for the purpose of comparing it with mean velocity. The instrument is of the following kind:—

A is a wind-sail or cowl kept facing the wind, at the top of a cylindrical vessel. B is a second cylindrical vessel, open at the top to the air but screened from wind. A and B are joined at the bottom by a capillary tube C, and the two vessels are filled to a convenient height by water, oil, glycerine, or some other fluid. In still air the fluid stands at the same height in each vessel, but in a wind the increased pressure in A causes a rise of level in B, which is observed by means of a float or some other convenient arrangement. The tube C is so much choked that a variability of pressure in A, acting for a few seconds, produces no perceptible rise in B, but a continuing rise of pressure in A of course produces its full effect on the level in B. It is, then, obvious from what has been said before, that the rise in B will vary as the velocity of mean square of the wind. The period over which the square of the wind's velocity is averaged depends on the choking of the tube C, and the approprate degree of fineness of the tube would have to be determined by trial.



The constant b referred to in Professor Stokes's letter is the constant of retardation of rise. Thus, suppose the excess of pressure in A, having been zero, suddenly becomes p, and that H is the difference of fluid level ultimately attained under difference of pressure p, and that h is the difference of level at an interval θ after the abrupt change.

Then it may be easily shown that—

$$\frac{H - h}{H} = e^{-b\theta}$$

whence it follows that $\frac{1}{b}$ is the interval after a sudden change at which $H - h$ has fallen to $\frac{1}{2{\cdot}78}$ of H. It would thus be easy, by creating an artificial pressure in A, and plotting out the rise of level in B on a time scale, to find the constant b with accuracy.

To determine the other constant a in Professor Stokes's formula amounts to the graduation of the scale of the instrument, and this would involve experiments with a whirling machine or something equivalent.

It is obvious that, if the wind blows with irregular velocity, the velocity of mean square exceeds the mean velocity, just as we have seen above that in Dines's experiment with a bridled anemometer a correction is necessary for the square of the wind's velocity. Professor Stokes then suggests that

* An easily intelligible term used in the kinetic theory of gases.

this new form of pressure anemometer might be used by comparison with ordinary anemometers, for the purpose of giving a numerical estimate of the gustiness of the wind.

This is undoubtedly correct, but I am unable at present to perceive exactly what increase of our meteorological knowledge would be acquired by such an estimate. On shore gustiness depends very largely on the position of surrounding objects, probably even of those at a considerable distance, and it can clearly be of little interest to know local effects of this kind. In carefully chosen sites, however, some general knowledge of the wind might be acquired, for it seems to be an accepted doctrine that different winds do, even at sea, differ in gustiness. But then the question arises as to what is gustiness? Now I cannot think that one constant is even approximately sufficient to define gustiness. The sudden impulsive puff of air, and the squall of short duration are distinct, but a number of puffs would leave the same amount of record in the proposed anemometer as one squall, and would be indistinguishable.

I do not understand that Professor Stokes actually advocates the construction of such an instrument, and it seems to me that whilst this is an interesting suggestion which it is valuable to have on record, we may postpone taking action on it until the utility of its records shall be more apparent.

(Signed) G. H. Darwin.

June 23rd, 1888.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 13 logs had been received, 9 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. T. J. Alderton	S.S. "Brindisi"	March 29—June 13, 1888.	London, Calcutta, and home.	1887, p. 133.
Capt. H. C. Carr -	"Superb" -	Sept. 21, 1887—June 8, 1888.	London, Melbourne, and home.	1886, p. 64.
Capt. Wm. Couper -	"Clackmannanshire."	Sept. 9, 1887—June 10, 1888.	Middlesborough, Adelaide, and home.	—
Capt. C. M. Hepworth, R.N.R.	S.S. "Port Pirie"	Dec. 20, 1887—June 5, 1888.	London, Australia, &c. -	1887, p. 87.
Capt. F. Marshall -	"Berkshire" -	Sept. 14, 1887—June 8, 1888.	Rangoon and home -	1887, p. 48.
Com. W. U. Moore, R.N. - - / Lieut. A. F. Balfour, R.N. -	H.M.S. "Rambler."	Jan. 1,—May 1, 1888.	Surveying China Sea -	1887, p. 133.
Capt. W. G. North -	S.S. "Tiger" -	Jan. 31—May 31, 1888.	Hull and Hamburg -	1887, p. 132.
Capt. G. W. Read, F.R.G.S.	S.S. "Auretta"	Feb. 9—May 27, 1888.	Bombay, Cocoanada, and home.	1887, p. 120.
Capt. A. Simpson -	S.S. "Australasian."	Dec. 21, 1887—June 18, 1888.	London, Cape Town, Melbourne, Sydney, Mauritius, Bombay, and home.	1887, p. 87.

Mr. Scott was instructed to present the Charts (O. 43) to Captain Couper and to convey the best thanks of the Council to the above observers.

Read—The following letter:—

(M.O. 1333.)

Board of Trade, (Marine Department,)
London, S.W., 25th June, 1888.

Sir,

I am directed by the Board of Trade to transmit to you, to be laid before the Meteorological Council, the accompanying pamphlet on the Law of Storms, to which their attention has been called by Sir Henry Morland, Captain I. M., Port Officer at Bombay, who claims that the author, Mr. Chambers, has made certain discoveries which show the necessity of modifying the usual rules for avoiding cyclones at sea, and to suggest for the consideration of the Meteorological Council whether it is desirable that official attention should be called to the pamphlet or any of the information published officially.

I am, &c.
(Signed) Thomas Gray.

The Secretary, Meteorological Office,
116, Victoria Street, S.W.

The subject was referred to the Hydrographer.

Captain Toynbee attended, to take leave of the Council, on his retirement.

The Chairman, in behalf of the Council, expressed to Captain Toynbee the regret they felt on his relinquishing the duties which he had so long and so conscientiously and ably discharged in the Meteorological Office, and the hope that he might still continue to take an interest in the subjects which had for so many years occupied his attention, and possibly to aid the Council in connexion with them.

Reported—That no storm warnings had been issued since the last meeting.

Read—The following letter (Minutes, 1887, p. 64):—

(M.O. 1278.)

DEAR MR. SCOTT, Wallington, Surrey, June 18th, 1888.

I HAVE much pleasure in handing you my paper on the diurnal range of the barometer, on which I have been working for more than 2½ years, and I shall feel obliged if you would kindly lay it before the Council in order to see whether they object to anything that I have said, for I would willingly alter anything which the Council thought objectionable. I should also feel very much obliged if the Council would kindly inform me whether they would wish the paper to come before the Royal Society or the Royal Meteorological Society, for I desire as far as possible to meet the wishes of the Council.

In conclusion, I wish to thank you, both on behalf of the Council and on your own behalf, for the many acts of kindness I have received at their hands and from yourself.

I am, &c.

Robert H. Scott, Esq. (Signed) F. C. BAYARD.

The Chairman was requested to examine the paper.

Read—Letter No. 1337 from the Hon. E. Ashley, asking for a small rent in recognition of ownership of the land passed over by the private wire at Mullaghmore.

Mr. Scott was instructed to offer one shilling yearly.

Submitted—The following paper, which was ordered to be printed:—

(M.O. 60, 1888.)

RESULTS of EXPERIMENTS at the KEW OBSERVATORY from JANUARY to JULY 1887, to determine the EFFECT of EXPOSURE on STANDARD BAROMETER READINGS.

THE want of perfect accordance between the readings of the self-recording barograph and the standard barometer, to which its indications are referred, has been a source of inconvenience and uncertainty ever since the former instrument has been in operation at the Kew Observatory.

Amongst the possible sources of this discrepancy, it has been thought that the march of the changes of atmospheric pressure might differ somewhat in the different rooms of the Observatory in which the two instruments are placed.

The standard barometer, Newman 34, is bolted to the mural quadrant in the eastern wing of the building, open freely to the access of light and air by windows and doors on all sides. The cistern of the barometer is 9 feet above the surface of the ground outside, and 34 feet above the mean sea level.

The barograph, on the other hand, is placed in the magnetograph room, in the basement, with its cistern 7 feet below the external ground level, and hence 18 feet above mean sea level, and 16 feet below the level of the standard barometer.

The windows of the room facing the north are all closed by shutters. The fireplace is also shut up, and the doors have no direct communication with the outer air. There is, however, a ventilator opening into the chimney at the level of the ceiling of the room, and it was thought possible that this producing a draught, might in a high wind affect the barometer somewhat.

With the view of determining what effect, if any, was due to the conditions in which the two instruments were placed, I put up the Fortin barometer, Adie No. 657, alongside the barograph with its cistern at the same height, and had readings made of it immediately after the standard at every observation from January to July 1887. The actual readings, amounting in number to 882, are submitted herewith, but for the discussion only those taken by good observers have been employed; all those made by lamplight have, in addition, been rejected, leaving 647 readings for treatment. Both instruments had their readings corrected for index error and temperature before entry on the sheet.

As it was considered desirable to treat the differences for various winds as well as for different barometric movements, they were classified, first, into barometer rising and barometer falling, then into groups when cyclonic and anticyclonic winds of forces ⊙ (0), ↿ (1), ↑ (2), ⇑ (3) in the scale adopted for the weather charts, were blowing. Finally the mean difference between the two instruments was found, and, then, the average difference irrespective of sign was computed, in order to obtain a criterion of the degree of reliability which might be placed upon any individual observation.

The mean barometric pressure of the period was 30·13 inches and the mean temperature was 55°.

For the difference in height above M.S.L., the Meteorological Office's tables for the reduction of the barometer to the same level give ± ·0174 in. as the correction to be applied.

The means of the readings of the two barometers give with a calm atmosphere differences of—

With barometer rising ·0170 in.
" " falling ·0171 in.

Hence the mean difference is ·0003 in. in one case or ·0004 in the other (practically nil), and we may therefore conclude that the two instruments are equally sensitive to change of barometric pressure. If we take the readings under all wind-forces, we get for rising barometer a mean of ·0172 in. and for a falling one ·0173, a similar difference of ·0001 inch.

Contrasting next the effect of direction of wind on the instruments, we get as the mean for all cyclonic winds a difference of ·0172, and for anticyclonic winds a difference of ·0173.

To discover the possible effect of air compression against the wall of the house which would probably affect the barometer room most, in high north-easterly winds we contrast the difference between the two instruments in cyclonic winds and anticyclonic of forces ↿ and ↑, there were no observations made with higher velocities than these:—

	↿	↑
We find for cyclonic -	·0176	·0166
And anticyclonics - -	·0173	·0171

a result which would show the effect to be insensible in the case of the anticyclonic winds, and to amount to ·001 in. for cyclones, whence from the construction of the building it would be expected to stand at a minimum.

Finally as a measure of the degree of accuracy with which the observations were made, each difference between the two reduced barometer observations was compared with the mean difference and the value entered without reference to sign. It was found to be virtually the same each month, and the final result was ± ·0026. Hence the probable uncertainty of a single barometric reading made by an ordinary skilled observer may be assumed to be ± ·003 in., and also that the effect of wind pressure upon the barometers in a building, either by massing the air against the walls or by producing a depression of the mercurial column through suction of a 40-feet chimney is very small, and need not be considered in ordinary barometric reductions.

(Signed) G. M. WHIPPLE.

Kew Observatory,
January 5, 1888.

116, *Victoria Street, July* 11, 1888.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (June 27) were read and confirmed.

Mr. Scott reported that a meeting of the International Meteorological Committee was fixed for Monday, September 3, at Zurich (Letter 1385), and he was authorised to attend it.

Mr. Baillie attended the Council and expressed his thanks to the members for his appointment.

The Chairman reported, with reference to Mr. F. C. Bayard's paper (Minutes, p. 32), that he considered that the Office might print the tables, leaving Mr. Bayard free to present his paper to any society he might select. Mr. Scott was instructed to inform Mr. Bayard accordingly. (P.C. 1516.)

SIR, Meteorological Office, June 30, 1888.

I HAVE the honour to report, for the information of the Council, on the work which has been done during the quarter ending 30th June 1888.

The plotting of the currents for all months of the year and for all oceans has been continued, and 340 Office logs have been entirely exhausted.

The currents in the Mozambique Channel furnished by the Deutsche Seewarte (referred to in my last report, see Minutes, 1888, p. 3) for the remaining six months of the year have been plotted, and all the currents from this source for the whole year have now been dealt with.

I was absent from the Office for five weeks summer vacation.

I am, &c.
(Signed) C. W. BAILLIE,
Navigating Lieutenant, R.N.

The Secretary.

Read—A memorandum from Mr. Baillie reporting that since the last meeting 5 logs had been received, 3 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. C. Crutchley, R.N.R.	S.S. "Kaikoura"	Mch. 10—July 7, 1888.	Plymouth, New Zealand, and home, viâ Capes.	1887, p. 133.
Capt. T. Leportier -	S.S. "Mira" -	April 7—June 25, 1888.	Liverpool, Calcutta, and home, viâ Suez.	1888, p. 2.
Capt. Thos. Mesnard	"Sierra Miranda."	Aug. 20, 1887—June 27, 1888.	Bombay, Rangoon, and home.	1887, p. 37.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Mr. Scott reported (Minutes, 1887, p. 134) that the Chairman, on March 22nd, had authorised an expenditure not exceeding 20*l.*, on the revision of the returns from the Royal Engineers and Army Medical Department, and he now submitted a further memorandum (Letter 1473) from Mr. J. A. Curtis stating that a further sum of 12*l.* would be required to complete the revision.—The increase requested was authorised.

Submitted—The following report on the forecasts for June 1888:—

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

JUNE.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	54	72	63	89
"	b	31	20	26	
"	c	11	4	7	
"	d	4	4	4	
Scotland, E.	a	65	72	69	86
"	b	23	12	17	
"	c	8	8	8	
"	d	4	8	6	
England, N.E.	a	50	62	56	85
"	b	38	19	29	
"	c	0	4	2	
"	d	12	15	13	
England, E.	a	62	50	56	85
"	b	27	31	29	
"	c	4	12	8	
"	d	7	7	7	
Midland Cos.	a	69	39	54	73
"	b	19	19	19	
"	c	8	23	16	
"	d	4	19	11	
England, S.	a	58	42	50	83
"	b	27	39	33	
"	c	11	15	13	
"	d	4	4	4	
Scotland, W.	a	38	58	48	73
"	b	35	15	25	
"	c	15	8	12	
"	d	12	19	15	
England, N.W.	a	73	50	62	89
"	b	23	31	27	
"	c	4	8	6	
"	d	0	11	5	
England, S.W.	a	54	42	48	83
"	b	35	35	35	
"	c	7	8	8	
"	d	4	15	9	
Ireland, N.	a	50	65	58	85
"	b	27	27	27	
"	c	15	4	9	
"	d	8	4	6	
Ireland, S.	a	50	54	52	75
"	b	27	19	23	
"	c	23	0	12	
"	d	0	27	13	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	60	67	64	90
"	b	30	23	26	
"	c	3	3	3	
"	d	7	7	7	
Scotland, E.	a	67	53	60	84
"	b	20	27	24	
"	c	3	10	6	
"	d	10	10	10	
England, N.E.	a	53	50	52	85
"	b	37	30	33	
"	c	3	7	5	
"	d	7	13	10	
England, E.	a	57	43	50	77
"	b	23	30	27	
"	c	10	17	13	
"	d	10	10	10	
Midland Cos.	a	57	40	49	79
"	b	30	30	30	
"	c	3	17	10	
"	d	10	13	11	
England, S.	a	53	50	52	78
"	b	30	23	26	
"	c	7	20	14	
"	d	10	7	8	
Scotland, W.	a	53	53	53	77
"	b	30	17	24	
"	c	10	23	16	
"	d	7	7	7	
England, N.W.	a	47	53	50	77
"	b	33	20	27	
"	c	10	20	15	
"	d	10	7	8	
England, S.W.	a	67	37	52	82
"	b	23	37	30	
"	c	3	20	12	
"	d	7	6	6	
Ireland, N.	a	60	57	59	79
"	b	17	23	20	
"	c	17	7	12	
"	d	6	13	9	
Ireland, S.	a	44	38	41	77
"	b	33	38	36	
"	c	23	7	13	
"	d	3	17	10	

SUMMARY.

British Isles	a	57	55	56	82
"	b	28	24	26	
"	c	10	9	10	
"	d	5	12	8	
British Isles	a	56	49	53	80
"	b	28	27	27	
"	c	8	14	11	
"	d	8	10	9	

Submitted—The following statement of accounts for the quarter ending 30th June 1888:—

Income.	£ s. d.	£ s. d.
Balance from year 1887-88	- -	2,649 7 1
Proportion of vote for quarter	- -	3,825 0 0
Repayment of expenses charged under—		
Incidental expenses	- -	2 2 3
Supply of Weather Information:		
D.W. Charts and Forecasts	52 4 7	
6 p.m. Charts	6 5 0	
Information for Press Agencies, &c.	24 3 6	
Telegrams	71 7 3	
		154 0 4
Sale of Instruments, &c.:		
Royal Navy account	9 6 0	
Mercantile Marine account	6 6 7	
		15 12 7
Commission charged on work done for Colonies, &c.	- -	8 6 8
		£6,654 8 11

Expenditure.	£ s. d.	£ s. d.
Administration:		
Payment of Council	250 0 0	
Secretary	200 0 0	
Salaries and wages	201 6 6	
Rent, fuel, and lighting	178 5 0	
Furniture and fittings	0 11 0	
Incidental and contingent expenses	98 1 10	
Pensions	10 14 1	
		938 18 5
Special Researches	- -	99 11 2
Land Meteorology:		
Observatories and stations	441 3 5	
Discussion and reduction of observations	334 14 0	
		775 17 5
Weather Information and Forecasts:		
Telegraphic reports and storm warnings	641 12 10	
Preparation and issue of reports and forecasts	418 11 9	
		1,060 4 7
Inspections:		
Salaries and travelling	- -	140 7 7
Ocean Meteorology:		
Discussion and reduction of observations	473 9 6	
Expenses incidental to the supply of instruments:		
Proportion for care and issue of instruments	50 0 0	
Royal Navy	262 12 4	
Mercantile Marine	126 11 5	
		912 13 3
Balance	- -	2,726 16 6
		£6,654 8 11

Liabilities.	£ s. d.	Assets.	£ s. d.
To Council	250 0 0	By cash at Bank	3,216 18 0
„ outstanding accounts or work uncompleted	314 9 9	„ „ at Office	71 3 6
„ Post Office (estimated)	240 0 0	„ H.M. Exchequer	325 0 0
„ sundry creditors	323 16 11	„ sundry debtors	242 1 8
„ balance	2,726 16 6		
	£3,855 3 2		£3,855 3 2

Submitted—The following Statement respecting the Records for January—June 1886 received from the Self-recording Observatories (see Minutes, 3rd January 1883) :—

JANUARY—JUNE 1886.	ABERDEEN.		ARMAGH.		FALMOUTH.		KEW.		VALENCIA.	
ANEMOGRAPH :—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action of Instrument - - -	Good.	Good.	Good.	Indiff.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient :—										
Due to stoppage of clock - - -	0	0	21 hrs.	22 hrs.	0	0	0	0	0	0
„ other causes - - -	0	0	0	3 hrs.	10 hrs.	0	0	2 hrs.	2 hrs.	3 hrs.
Number of errors discovered :—										
By general examination - - -	0	0	5	23	1	5	5	3	11	19
Results of 40 re-measurements :—										
Greatest difference - -	1·0	2·0	2·0	2·0	1·0	2·0	2·0	2·0	1·0	3·0
Mean difference irrespective of sign -	0·1	0·5	0·1	0·4	0·1	0·5	0·1	0·4	0·1	0·6
Residual difference (—Meteorological Office)	0·0	0·0	0·0	+0·1	0·0	0·0	0·0	0·0	0·0	−0·1
Orientation verified - - - -	Monthly.	—	3 times.	—	Monthly.	—	Monthly.	—	Monthly.	—
RAIN GAUGE :—										
Action of Instrument - - - -	Indifferent.		Good.		Indifferent.		Fair.		Good.	
Records deficient :—										
Due to stoppage of clock - - -	0		0		0		0		14 hrs.	
„ other causes - - -	0		0		0		0		0	
Number of errors discovered :—										
By general examination - - -	0		7		9		7		3	

	ABERDEEN.	FALMOUTH.	KEW.	VALENCIA.
BAROGRAPH :—				
Action of Instrument - - -	Good.	Good.	Good.	Good.
Character of Photography - - -	Do.	Do.	Do.	Do.
Records deficient :—				
Due to stoppage of clock - - -	0	0	0	0
„ failure of light - -	0	0	0	5 hrs.
„ other causes - - -	0	0	8 hrs.	13 hrs.
Number of errors discovered - - -				
In entry of standards - - -	—	8	12	5
„ calculating residuals - - -	—	4	1	0
„ applying „ - - -	—	2	0	13
By general examination - - -	—	8	66	55
Results of 40 re-measurements :—				
Greatest difference - - -	—	·008	·014	·010
Mean difference irrespective of sign -	—	·003	·002	·004
Residual difference (—Meteorological Office)	—	·000	+·001	−·001
Mean monthly difference between simultaneous Barograph and Standard Barometer readings - - - - -	—	·002	·002	·002

	ABERDEEN.		FALMOUTH.		KEW.		VALENCIA.	
THERMOGRAPH :—								
Action of Instrument - - -	Good.		Good.		Good.		Good.	
Character of Photography - - -	Do.		Do.		Do.		Do.	
Records deficient :—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock - - -	0	0	0	0	6 hrs.	6 hrs.	0	0
„ failure of light - - -	0	0	0	0	0	0	0	0
„ imperfectly moistened bulbs -	—	25 hrs.	—	2 hrs.	—	98 hrs.	—	20 hrs.
„ partially frozen bulbs - -	—	264 hrs.	—	32 hrs.	—	129 hrs.	—	11 hrs.
„ other causes - - -	0	0	0	0	8 hrs.	15 hrs.	0	3 hrs.
Number of errors discovered :—								
In entry of standards - - -	0	2	1	2	1	3	3	4
„ maxima and minima - - -	0	—	5	—	14	—	7	—
By general examination - - -	2	2	2	3	8	10	2	2
Results of 40 re-measurements :—								
Greatest difference - - -	0·2	0·3	0·3	0·3	0·3	0·3	0·5	0·5
Mean difference irrespective of sign -	0·1	0·2	0·1	0·1	0·1	0·1	0·2	0·1
Residual difference (—Meteorological Office)	−0·1	+0·2	+0·1	0·0	0·0	0·0	+0·1	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings - - - - -	0·1	0·2	0·1	0·1	0·2	0·2	0·2	0·2

NOTES.

ABERDEEN.—*Rain* traces faint.

In consequence of the slipping of the thermometer attached to the tandard *barometer*, the corrections for temperature have been rendered doubtful, and the standard readings have had to be rejected throughout.

Wet bulb records.—A large proportion of the hours lost were due to want of attention.

ARMAGH.—*Velocity* trace intermittent, at low rates.

FALMOUTH.—The *anemograph* pricker bent, causing the direction and velocity traces to mark 10′ late.

Rain curves indifferently attached, and range of pencil very short at times. There is a serious want of agreement between the Beckley automatic and the check gauge records. Traces also faint.

The tabulation of the *thermograph* dry traces for January and February was done at the Meteorological Office; the "results of 40 re-measurements" are for four months only.

KEW.—The regulation of the clocks was very indifferent at times.

Rain curves indifferently attached, and action of pencil irregular. This is partly due to the fact that some old forms were in use.

Definition of *barograph* and *thermograph* traces very indifferent at times.

Proportion of thermograph standards rejected during May and June was rather large.

VALENCIA.—The *barograph* and *thermograph* lights very irregular in intensity, and zero lines very intermittent. Paraffin lamps in use.

(Signed) T. E. ALLEN.

Submitted the following:—

LIST of STORM WARNINGS issued to the COASTS of the BRITISH ISLANDS since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result, as to the character of the Warning.

1. WARNINGS ISSUED.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experieneed (if any), and Approximate Time of occurrence.	Result.* Character of Warning.
1888.				
July 2nd, 7.20 p.m. -	Scotland, E. -	North cone	N.Ely. winds, strong to gale early on 3rd.	A
„ „	England, E. (northern part).	„	Neither gale nor strong wind -	C
July 9th, 3.20 p.m. -	Scotland, E. (northern part).	North cone	Moderate to fresh Nly. gales, nights of the 9th and 10th.	A

* A = complete success (*i.e.*, justified by gales of force 8 or more, by Beaufort's scale).
B = partial „ „ „ strong winds, forces 6 or 7 (Beaufort's scale).
C = failure (*i.e.*, not justified by either gales or strong winds).

SUMMARY.

A - - - - -	2
C - - - - -	1
	3

GALES FOR WHICH NO WARNING WAS ISSUED.—None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
11th July 1888.

Submitted—The following statements of work during June 1888:—

MARINE BRANCH.

July 10, 1888.

Examined 19 new logs and 2 lighthouse registers.

Preparing a chart showing the tracks of cyclonic systems over the North Atlantic and neighbouring Continents during October 1882.

Making a daily summary of the observations and remarks contained in the logs of ships affected by the cyclones of June 1885 in the Arabian Sea.

Discussion of Red Sea data from Office and Admiralty logs.

Preparing ocean currents for charting by the female staff.

Supplying the solicitor to the Board of Trade with particulars of the weather experienced in the vicinity of the Azores between December 25 and 27, 1887, for the "Donegal" inquiry (Letter M.O. 1294).

Copying various notices from log 7,168 (s.s. "Australasian") for the Hydrographer and the *Nautical Magazine*.

Indexing data in ocean 10-degree squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To 30th June 1888.)

11th June 1888.

Monthly Weather Report.—(Same as at date of last Report).

Weekly Weather Report.—Issued to date. All Appendices, &c. well in hand. Steps are being taken to prepare for enlarging the maps, &c. for the new issue (1889).

Daily Weather Report.—Issued to date. Monthly summary, with corrections, additions, &c. for May, issued promptly.

Plotting of Daily Weather Telegrams from U.S.—Done to date. All arrears now overtaken.

Investigation into prevalence of Fog overBritish Isles.—Still in abeyance, owing to Mr. Brodie's absence.

Primary Checking of Storm Warnings, 1888.—Done to date.

Checking Daily (3.30 p.m. and 8.30 p.m.) *Forecasts.*—Done to date.

Appendices to Annual Report, 1888.—Again revised.

Hay Harvest Forecasts, 1888.—System organized; issue of forecasts commenced on 11th June.

During the month Mr. Brodie took his four weeks leave. I have therefore been unable to attend to anything but routine work; and, as some of the other clerks also have been on leave, I have frequently had to do a good deal of the work at home—although attending at the Office during the week for 11 hours daily, and twice each Sunday.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

July 2nd, 1888.

Observatory Returns.—Proof of Hourly Readings to end of October 1885 revised and signed for press. The calculation of the hourly vapour tension, hourly values, and of the daily and other means of temperature and pressure, &c. finished for December 1885. The annual tables for the year 1885 prepared in English and French measures. The means for January 1886 have been begun.

Quarterly Weather Report.—The monthly maps for Part IV., 1879, are in hand; the general summary for the quarter is completed and the monthly remarks have been commenced.

Harmonic Analyser.—The analysis of the barograms for 1880 completed as far as Aberdeen. The temperature coefficients for five-day periods in 1882 worked from the analyser readings.

Miscellaneous.—The usual examination of sunshine records occupied more time than usual this month.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

July 1st, 1888.

Examinations.

August (1886).—Completed.

April and May 1888.—Partial examination of the Valencia work for the Registrar-General of Ireland.

Weekly examination (on receipt) of curves and documents from all stations.

Reports, Investigations, &c.

Re Falmouth wet bulb differences (altered upper zero line value to 81°·0).

Re the value in true inches at 30·0 inches of the barograph traces at the different observatories.

Miscellaneous.

Computing a table of corrections for temperature applicable to barometers with brass scales (30° to 100°, and 27 to 31 inches) and revising proof of same.

Reading proof of the "Code of Regulations" by Mr. Whipple, and reviewing the same, &c.

(Signed) T. E. ALLEN.

Reported—That the following cheques had been drawn during the month of June:—

1888.		£	s.	d.	£	s.	d.
June 2nd.	J. S. Harding, jun., for payment of weekly salaries			-	15	16	0
„ 9th.	„ „ „			-	15	16	0
„ 16th.	„ „ „			-	15	16	0
„ 23rd.	„ „ „			-	15	16	0
„ „	R. H. Scott, Secretary - - - -			-	66	13	4
„ „	J. S. Harding, jun. - } Office salaries - - -				27	15	6
„ „	T. D. Bell - - }				16	5	0
„ „	J. Sheerman, salary (harmonic analysis) - - -				11	5	0
„ „	J. E. Cullum, salary (Valencia Observatory) - -				19	3	4
„ „	R. H. Curtis - }				22	18	4
„ „	J. A. Curtis - -				18	15	0
„ „	T. E. Allen - -				16	13	4
„ „	C. H. Thompson - } Salaries (discussion, &c. of				12	10	0
„ „	S. Call - - } observations).				12	1	8
„ „	R. G. Canham -				7	18	4
„ „	A. H. Bell - -				7	18	4
„ „	L. H. Powers - }				4	11	8
„ „	F. Gaster - - }				25	15	7
„ „	F. J. Brodie - -				18	15	0
„ „	G. G. Francis -				18	5	7
„ „	A. J. Rigby - - } Salaries (preparation, &c. of Weather Reports).				17	16	3
„ „	R. Sargeant - -				12	13	1
„ „	A. R. Simpkins -				10	6	3
„ „	C. W. Heinemann - }				5	8	4
„ „	Capt. H. Toynbee - }				33	6	8
„ „	Nav.-Lt. C. W. Baillie, R.N. - -				22	18	4
„ „	R. Strachan - -				27	15	6
„ „	C. Harding - - } Salaries (discussion, &c. of observations, and care of				22	18	4
„ „	H. Harries - - } instruments).				15	8	4
„ „	W. Allingham -				15	8	4
„ „	W. G. James -				11	13	4
„ „	F. T. Bullen - -				9	3	4
„ „	R. F. Wallace - }				9	3	4
„ 30th.	J. S. Harding, junr., for payment of weekly salaries -				15	16	0
„ „	G. J. Mayhew, rent - - - - -			-	158	15	0
„ „	Pickford & Co., carriage of parcels -	2	11	10			
„ „	„ „ (foreign) -	4	4	3			
					6	16	1
„ „	J. H. Woodstock, packing cases - -	2	0	0			
„ „	„ „ - -	3	2	6			
					5	2	6
„ „	J. S. Harding, senr., pension - -	-		-	10	14	1
„ „	H. Williams, care of bridled anemometer - - -	2	10	8			
„ „	„ care of Robinson's anemometer - - -	2	11	3			
					5	1	11
„ „	Royal Meteorological Society, observations	23	4	3			
„ „	„ „ inspections	25	0	0			
					48	4	3
„ „	C. Niven, Aberdeen Observatory - -	70	7	6			
„ „	J. L. E. Dreyer, Armagh „ -	12	10	0			
„ „	W. L. Fox, Falmouth „ -	62	8	6			
„ „	Fleetwood Improvement Commissioners, care of anemometer - - -	2	10	9			
„ „	R. Grant, Glasgow observatory - -	18	15	0			
„ „	Kew Committee, allowance for quarter -	100	0	0			
„ „	W. Harrison, care of N. Shields anemometer	3	0	9			
	Carried forward -	£269	12	6	834	18	3

1888.		£	s.	d.	£	s.	d.
	Brought forward -	269	12	6	834	18	3
June 30th.	W. I. Fortescue, care of Orkney anemometer	2	10	0			
„ „	S. J. Perry, Stonyhurst observatory -	13	14	3			
„ „	J. E. Cullum, Valencia „ -	15	1	0			
„ „	J. O'Driscoll and Sons, rent at Valencia -	25	0	6			
					325	18	3
„ „	G. T. Watson, care of Yarmouth anemometer - - -	3	18	0			
„ „	„ meteorological reports -	4	6	6			
					8	4	6
„ „	H. Todd, Cambridge - - -	4	11	0			
„ „	H. Mohn, Christiania - - -	5	10	0			
„ „	P. Curnow, Dungeness - - -	4	11	4			
„ „	W. Edmonds „ - - -	2	12	0			
„ „	W. Brand, Dunrossness - - -	3	18	6			
„ „	W. H. Bunce, Hawes Junction - -	1	19	3			
„ „	S. Richards, Holyhead - - -	3	18	5			
„ „	G. G. Appleton, Hurst Castle - -	3	19	2			
„ „	J. Fisher, Jersey - - - -	4	1	0			
„ „	F. Gaster, London - - -	3	18	0			
„ „	W. Berridge, Loughborough - -	3	5	4			
„ „	Secretary of Lloyd's, for Malin Head -	4	17	6			
„ „	K. Kerr, Mullaghmore - - -	5	5	4			
„ „	A. Penny, Nairn - - - -	4	4	6			
„ „	W. Wickham, Oxford - - -	3	12	6			
„ „	O. Boeddicker, Parsonstown - -	3	5	0			
„ „	W. Hewitt, Prawle Point - -	3	6	6			
„ „	S. Blake, St. Ann's Head - - -	3	6	6			
„ „	W. Thomas, Scilly - - -	7	10	4			
„ „	J. B. Smith, Spurn Head - - -	3	5	3			
„ „	J. Forbes, Stornoway - - -	5	14	6			
„ „	J. Sinclair, Wick - - - -	3	5	0			
„ „	F. Guy, York - - - -	3	18	0			
					93	14	11
„ „	Postmaster General, telegrams - -	-		-	180	7	8
„ „	J. R. Jones, Aberdeen agent - -	2	18	7			
„ „	J. Fowler, Cardiff agent - - -	3	3	6			
„ „	L. Allen, Dundee „ - - -	3	15	7			
„ „	Z. Scaping, Hull „ - - -	2	12	6			
„ „	J. Gill, Liverpool „ - - -	22	16	9			
„ „	D. Forbes, Southampton agent - -	9	13	0			
					44	19	11
„ „	P. Adie, repairing instruments, M.O. account	4	3	6			
„ „	„ „ "A" „	9	14	0			
„ „	„ „ "B" „	12	6	0			
					26	3	6
„ „	T. De La Rue & Co, sunshine cards -	-		-	25	19	2
„ „	J. S. Harding, jun., petty cash - -	-		-	40	0	0
„ „	C. Harding, for payment of accounts for copying observations for Utrecht M.O. - - -	-		-	19	18	9
„ „	F. Gaster, for payment of allowance for extra attendance for telegraphy - - - -	-		-	17	0	4
					£ 1,617	5	3

116, *Victoria Street, October* 31, 1888.

PRESENT:

MR. GALTON IN THE CHAIR.

MR. BUCHAN.	MR. STONE.
PROFESSOR DARWIN.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (July 11) were read and confirmed.

Read—The following letters (Minutes, p. 23) :—

98,280.
(M.O. 1208.)

Agricultural Department, Privy Council Office,
44, Parliament Street, Westminster, S.W.,
July 14, 1888.

SIR,

REFERRING to my letter, bearing the above number, of the 9th June last, on the subject of Mr. Whitehead's suggestion as to the distribution of weather forecasts at the seasons of haymaking and harvest, and inquiring as to the probable cost of distribution of the telegrams conveying the information, I am directed to request that the Lords of the Committee of Council for Agriculture may be favoured with a reply thereto at your earliest convenience.

I am, &c.
(Signed) HERBERT N. SUFT.

The Secretary, Meteorological Council,
116, Victoria Street, S.W.

P.C. 1609.
(M.O. 1208.)

Meteorological Office, July 21, 1888.

SIR,

IN continuation of former correspondence on the subject of weather forecasts for agricultural purposes, and in reply to your letter of the 14th instant, No. 98,280, I am now directed to inform you that the subject having been brought before the Meteorological Council, they desire to submit the following observations for the consideration of the Lords of the Committee of Council for Agriculture.

The Meteorological Council cannot doubt that much advantage would be gained by persons engaged in agriculture making greater use of the information collected by the Meteorological Office, and more generally obtaining access to the weather forecasts which are prepared daily in the Office, and which have for several years past been supplied to particular localities free of charge. They desire to explain, however, that the funds at their disposal being necessarily limited, it has hitherto only been in their power to allot a comparatively small sum to the object in question, and to undertake the supply of forecasts in a tentative and experimental manner, in the hope that if their utility were generally recognised some more complete system could be organised, and the necessary funds provided for the purpose from some suitable source.

It will be apparent that for the special object of supplying weather forecasts during the harvest seasons it would only be necessary to issue them to certain selected stations in selected districts for limited periods, and the selection thus made must be left to those who have a sufficient knowledge of the requirements of different parts of the country, a knowledge which the Meteorological Office does not possess. It is therefore not in the power of the Council to form any estimate of the probable number of stations, or of the cost of giving effect to such a proposal, but it may be approximately stated that on the basis of a daily telegram costing sixpence continued for one month, about 15*s.* would be required for each harvest at each station.

The Council would view with much satisfaction any measures taken by the Agricultural Department with a view to the wider dissemination of the harvest weather forecasts, and will co-operate in any way in their power in securing this. They will also most willingly aid the Department in the preparation of returns of weather or temperature likely to be useful to agriculturists, and they may point to the registers which are now published by the Office, and more particularly to those issued with the Weekly Weather Reports, which have been drawn up in consultation with Dr. Gilbert, F.R.S., as indications of what they have already done in this direction.

I am, &c.
(Signed) ROBERT H. SCOTT.

Agricultural Department, Privy Council Office,
(M.O. 1636.) 44, Parliament Street, Westminster, S.W.,
August 7, 1888.

SIR,

I HAVE submitted to the Lords of the Committee of Council for Agriculture your letter of the 21st of July last respecting Mr. Whitehead's proposal that the information collected by the Meteorological Office should be disseminated by the Agricultural Department among persons engaged in agriculture by enabling them to obtain, during the time of harvest, more general access to the weather forecasts which are prepared daily in your Office.

This Department having no special funds available for the purpose it became necessary to apply to the Treasury to sanction the expenditure.

I am now directed by the Lords of the Committee to state that the Treasury hesitate to authorise the proposed expenditure, feeling great doubts whether similar services to those now performed by the Meteorological Office should be undertaken by another Department.

I am to request that you will be good enough to convey the thanks of their Lordships to the Meteorological Council for their proffered assistance in this matter.

I am, &c.
(Signed) C. S. PEEL.

Robert H. Scott, Esq., M.A.,
Meteorological Office,
116, Victoria Street, S.W.

Mr. Scott stated that he had received from Mr. C. Whitehead a letter (dated August 17), in which it was stated that the amount for which the sanction of the Treasury had been asked was only 25*l.*, and he was instructed to ask Mr. Whitehead for the particulars on which this estimate has been founded (P.C. 2224).

Mr. Scott reported that he had attended the meeting of the International Committee at Zurich at the beginning of September. (Minutes, p. 34.) The meeting had been of very short duration, and the report would be published very speedily.

Mr. Scott reported that on his recent visit to Valencia he had found that the direction record of the electrical anemometer, then recently re-erected (Minutes, p. 18), was unsatisfactory. He had written to the Post Office (P.C. 2075) and had received instructions (Letter 1977), which had been forwarded to Mr. Cullum with directions to carry them out (P.C. 2167).

Mr. Scott was instructed to communicate Mr. Cullum's letter to Mr. Preece.

Read—Letter 1871 from Lloyd's, stating that they contemplated establishing signal stations at—

The Butt of Lewis,
Cape Wrath,
A point on the west coast of Skye,

and asking if the Council required information from any of these points. (Minutes, p. 23.)

Mr. Scott was instructed to reply that the Council were not at present in a position to increase the number of their reporting stations (P.C. 2230).

Submitted—Reports on the inspection of certain fishery barometers by Mr. Abercromby (Letter 1897), (Minutes, p. 29), and Captain Toynbee (Letter 1716).

Mr. Scott was instructed to prepare for the Council an analysis of these reports.

Submitted—A chart showing the mean barometrical pressure over the ocean, as compiled from the pressure charts for the four cardinal months. It was resolved that a chart be prepared showing the range of the means of those four months.

Reported—That certain notices of a hurricane at the beginning of September had been received from the Bahamas and their vicinity. It was resolved that these be forwarded to the Hydrographer.

Read—Letter 1680 from Dr. John Tulloch, colonial surgeon, Tobago, asking for the loan of instruments. Granted (P.C. 2238).

Reported—That Mr. Dines had commenced experiments with a bridled anemometer similar to that at Holyhead (Minutes, p. 13), and had applied (Letter 2026) for an electric bell. Permission to procure one had been given (P.C. 2149).

Read—A memorandum from the Marine Superintendent reporting that since the last meeting 61 logs had been received, 44 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. P. Aldrich, R.N. Lieut. N. T. Chen, I.C.N. Sub.-Lieut. E. B. Kiddle, R.N.	H.M.S. "Egeria"	Nov. 1, 1887—May 31, 1888.	Christmas Island to Mauritius, Australia, and New Zealand.	1887, p. 120.
Capt. R. F. Briscoe Mr. J. C. Long, R.N.R., (first officer).	S.S. "Kaisar-i-Hind."	Aug. 3—Oct. 11, 1888.	Calcutta and home -	— 1888, p. 10.
Capt. R. Campbell -	S.S. "Elton" -	May 9—Sept. 17, 1888.	Bombay and home, viâ Suez, also Cardiff to Suez.	1888, p. 10.
Capt. G. A. Chaddock.	Barque "Elissa"	July 15, 1887—Jan. 8, 1888.	Mauritius, India, and back to Mauritius.	1887, p. 85.
Staff.-Com. E. S. Clapp, R.N. H. K. Sturdee -	Schooner "Richmond."	Dec. 21, 1887—May 1, 1888.	At the Bahamas -	1887, p. 133.
Comr. A. C. Clarke, R.N. Lieut. C. E. Pritchard, R.N.	H.M.S. "Espiègle."	Mar. 3—Sept. 14, 1888.	West Coast of South America, Honolulu, and Esquimalt.	1888, p. 18.
Capt. Jas. Clarke, R.N.R.	S.S. "Olbers" -	April 3—Sept. 4, 1888.	Southampton, Buenos Ayres, and home (2 voyages).	1888, p. 2.
Capt. D. S. Cromarty	Barque "Cassandra."	Sept. 12, 1887—Oct. 8, 1888.	Sydney (N.S.W.), Port Augusta, and home, viâ Cape of Good Hope.	1887, p. 48.
Capt. L. C. Dart -	"Alcester" -	Aug. 25, 1887—June 27, 1888.	Liverpool, Rangoon, and home.	1887, p. 48.
Comr. L. S. Dawson, R.N. Lieut. H. H. Douglas, R.N.	H.M.S. "Sylvia"	May 12 - Sept. 12, 1888.	Surveying in the Red Sea and Mediterranean.	1887, p. 120.
Capt. John I. Dunbar	S.S. "Arracan"	May 12—Aug. 26, 1888.	Rangoon and home -	1888, p. 10.
Capt. Thos. England	Barque "Jane"	Mar. 3, 1887—Aug. 5, 1888.	United States, West Indies, and home. To South America and home.	1887, p. 48.
Capt. T. K. Exham, F.R.A.S.	R.M.S. "Esk" -	April 10—July 31, 1888.	Trading between West Indies and Demerara.	1887, p. 120.
Lieut. and Comr. A. M. Field, R.N.	H.M.S. "Dart"	Jan. 1—April 30, 1888.	Surveying on the Australian Station.	—
Capt. W. D. Fraser -	Barque "Thomas S Stowe."	April 27, 1887—Aug. 5, 1888.	Brisbane, Newcastle (N.S.W.), Portland (Oregon), and home.	1887, p. 5.
Capt. D. Fullarton -	"Timaru" -	Jan. 5—March 17, 1888.	London to New Zealand	1887, p. 19.
Capt. W. V. Graham	"Bolan" -	Oct. 28, 1887—Sept. 6, 1888.	Calcutta and home -	1887, p. 48.
Capt. David Gray -	S.S. "Eclipse" -	Apr. 18—Sept. 21, 1888.	Peterhead, Greenland, and home.	1887, p. 75.
Capt. John Gray -	S.S. "Hope" -	Mar. 14—July 22, 1888.	Peterhead, Greenland, and home.	1887, p. 48.
Capt. R. W. B. Haselwood. Mr. J. C. Long, R.N.R.	S.S. "Kaisar-i-Hind."	May 10—July 7, 1888.	London to Bombay, and home.	— 1888, p. 10.

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. G. M. Hicks	R.M.S. "Nile"	May 10—July 12, 1888.	Southampton, Buenos Ayres, and home.	—
Capt. W. P. Hughes	"Candahar"	Dec. 3, 1887—Sept. 29, 1888.	Calcutta and home	1886, p. 131.
Capt. R. C. Jennings	S.S. "Colina"	Mar. 3—Aug. 30, 1888.	North America and home (4 voyages).	—
Capt. A. H. Kemp	Barque "Hudson."	Nov. 16, 1887—July 16, 1888.	London, New Zealand, and home.	1887, p. 48.
Capt. Joseph Maxwell.	"Oamaru"	Jan. 28—Oct. 3, 1888.	Auckland, Wellington, and home.	1887, p. 87.
Capt. W. H. Milner	R.M.S. "Avon"	May 13—Aug. 2, 1888.	Southampton, West Indies, and home.	1887, p. 132.
Capt. P. Moignard	Barque "Astoria"	July 25, 1887—Aug. 21, 1888.	San Diego, California, Jacoma, and home.	1887, p. 19.
Capt. Peter Murdoch	"Sierra Lucena"	Sept. 8, 1887—June 26, 1888.	Bombay, Rangoon, and home.	1886, p. 65.
Capt. Francis Norman.	Barque "Cape Clear."	June 11, 1887—July 31, 1888.	Liverpool, Wellington (N.Z.), Callao, and home.	1886, p. 88.
Capt. W. G. North	S.S. "Tiger"	June 1—Oct. 1, 1888.	Trading between Hull and Dantzic.	1888, p. 31.
Capt. G. F. Parson	"Earnock"	Jan. 16—Sept. 13, 1888.	London, Adelaide, and home.	1887, p. 95.
Capt. C. W. Pearson	S.S. "Strathleven."	Feb. 1—July 22, 1888.	From Gibraltar to Yokohama and New York.	1887, p. 123.
Capt. F. W. Powles	S.S. "Essequibo"	June 10—Sept. 2, 1888.	West Indies, Gulf of Mexico, and home.	1888, p. 20.
Capt. D. W. A. Quaile.	"Orissa"	Mar. 28, 1887—June 29, 1888.	Maryport, Townsville, San Francisco, and home.	1886, p. 112.
Capt. W. Randall	"Laomene"	Sept. 23, 1887—June 28, 1888.	From Calcutta to Mauritius, Calcutta and New York.	1886, p. 96.
Capt. G. W. Read. Mr. W. H. Richardson (Chief Officer).	S.S. "Auretta"	June 21—Aug. 13, 1888.	Venice, Odessa and home.	1888, p. 31.
Capt. P. Rowsell	R.M.S. "Tagus"	July 5—Sept. 2, 1888.	River Plate and home.	—
Capt. George Scott	"Hoghton Tower"	Feb. 16—Sept. 24, 1888.	Mauritius, Calcutta, and home.	1888, p. 20.
Capt. A. Simpson	Barquentine "Traveller."	May 2—Sept. 2, 1888.	Peterhead, Greenland, Spitzbergen, and home.	1886, p. 96.
Capt. W. W. Swinton.	Barque "Banffshire."	Nov. 25, 1887—Sept. 9, 1888.	Brisbane, Wallaroo, and home.	—
Capt. S. Trott. Mr. T. C. Newton, (Chief Officer).	S.S. "Minia"	May 19—Aug. 31, 1888.	Newfoundland, and on North Atlantic Cable Ground.	1888, p. 10.
Capt. H. Walker	S.S. "Cephalonia"	April 6—Oct. 23, 1888.	Boston, U.S. and home (6 voyages).	1888, p. 2.
Capt. J. Wilson	S.S. "Ethiopia"	Jan. 27—Aug. 20, 1888.	New York and home (5 voyages).	1885, p. 19.
Capt. Robert Woolward.	R.M.S. "Don"	Mar. 23—July 22, 1888.	Southampton, West Indies, Colon and home (2 voyages).	—

Mr. Scott was instructed to present the Charts (O. 27) to Captains Field, Hicks, Rowsell, Swinton, and Woolward; (O. 32) to Captains Briscoe, Haselwood, and Jennings, and to convey the best thanks of the Council to the other observers.

Submitted the following report:—

REPORT of INSPECTION of the IRISH and WELSH STATIONS 1888.

I have to report that I have completed the inspection of these stations, with three exceptions. *Armagh* where scarlet fever was in the house, *Foynes* and *Waterford* where I thought the inspection might be omitted this year.

Telegraph Stations.

Holyhead, visited September 29.—There is nothing calling for remark at this station.

Parsonstown, visited October 1.—At this station there has been a change of observer, the present reporter Haines has only recently been appointed, and has been found to make some mistakes through carelessness. Dr. Bœddicker has kindly undertaken to instruct the young man.

Valencia, visited October 4.—There is nothing special to be remarked about the telegraphic service, except that the attendance at the local post office on Sunday mornings is not punctual. We have difficulty on this score at Malin Head also.

The electrical anemograph had been erected shortly before my visit. The registration of direction was not satisfactory at the date of my presence at Valencia.

I am sorry to say that the water obtained by the Abyssinian well which was sunk last year, though abundant in quantity is so charged with peaty matter as to be unfit for domestic use. This is unfortunate, as it was unexpected, a well close at hand yielding water which is quite pure from peaty contamination, as that water runs through limestone gravel.

Roche's Point, visited October 5.—This station remains in good order. The light to the barometers is not good, and never will be while the house is unchanged.

Donaghadee, visited October 9.—The observations are well taken, I have arranged that a weather-cock be supplied for erection on a flagstaff, the property of the observer.

Malin Head, visited October 12.—I am glad to say that Lloyd's are repairing the signal tower where the barometers are placed, which has hitherto been in a dilapidated condition.

At this station, as already mentioned, there is a want of harmony between the observer and the nearest post office clerks, each side complaining of the other.

I myself consider both in fault.

The observations are well taken.

Mullaghmore, visited October 15.—This station was in very good order, as usual.

Belmullet, visited October 17.—This station continues to work well.

St. Ann's Head, visited October 25.—There is nothing calling for special remark at this station.

Stations of the Second Order and Weekly Weather Report Stations.

Killarney (W.W.R. station), visited October 3.—Archdeacon Wynne was absent. The instruments were in good condition, and Miss C. Wynne, the second daughter, seemed capable and careful in registration.

Colebrooke, visited October 10.—This station was satisfactory.

Londonderry, visited October 11.—The exposure at this station is not so good as formerly, the observer has changed his residence, and his garden is not so open as that attached to his previous house.

Markree, visited October 16.—Mr. Marth has trained an assistant, Miss L. Frizelle, to take the readings, and during his absence in Germany in June last she managed the station satisfactorily.

Currygrane (*Edgeworthstown*), visited October 19.—This station has recently become one of the second order, having previously only furnished observations for the Weekly Weather Report. The observer is young, but seems very careful and anxious to learn.

Dublin, Glasnevin, visited October 23.—The observations are well taken. The exposure of the rain-gauge is not open enough, and I propose to supply another gauge to test the effect of exposure, as an open site is attainable.

Dublin (*Fitzwilliam Square*), visited October 23.—This station calls for no special remark It continues to be the most satisfactory station we have, except as regards the exposure of thermometers and rain-gauge.

Dublin, Phœnix Park, visited October 23.—The only matter calling for notice here is that the observers have compiled for themselves a table of proportion between velocity and Beaufort's scale of wind, which is not satisfactory. A new one must be supplied to them.

Kilkenny, visited October 24.—The observations for the Weekly Weather Report are well taken. The observer, Mr. Carlton, is desirous of taking the second order observations at 9 a.m and 9 p.m. if we can induce Lord Ormonde to supply him with a mercurial barometer and good ordinary thermometers.

St. David's, visited October 26.—This station is, as usual, in very good order.

I also visited the fishery barometers at Belfast, Bangor, Groomsport, Donaghadee, Valencia, Wicklow, and Kingstown, and took over new barometers for two stations in the co. Donegal, Kincaslagh (near Burton Port), and Portnoo (near Ardara). At Wicklow the barometer had air in the tube, which I removed.

Robert H. Scott.

The following table shows the results of the thermometric comparisons:—

Corrections to be applied to the readings of—

Stations.	Dry Bulb.	Wet Bulb.	Max.	Min.	Spare Ther.	Remarks.
Stations of the Second Order.						
Brookeborough -	−0·8	−0·9	−0·5	−0·4	—	
Dublin (City) - -	−0·1	−0·1	−0·1	−0·2	—	Grass min. +0·2.
Dublin (Phœnix Park)	−0·6	−0·4	−0·4	−0·3	—	Do. −0·3.
Edgeworthstown -	−0·3	−0·2	−0·4	+0·3	−0·1	Do. +0·5. Spare ther. is a Kew Standard.
Glasnevin - -	−0·1	−0·4	−1·0	+0·3	—	Do. +0·4.
Londonderry - -	−0·4	−0·4	0	+0·2	−0·5	
Markree Castle -	−0·6	−0·4	−0·2	−0·2	—	
Parsonstown - -	−0·5	0	−0·6	−0·2	—	Do. −0·1.
St. David's - -	−0·1	−0·1	−0·2	0	—	Do. −0·1.
Telegraphic Reporting Stations.						
Holyhead - -	0·0	−0·2	−0·4	+0·1	0	
Malin Head - -	−0·5	−0·5	−0·4	−0·3	−0·6	
Mullaghmore - -	−0·5	−0·4	0	−0·4	−0·7	
Belmullet - -	−0·7	−0·5	−0·3	−0·8	—	
Donaghadee - -	−0·1	−0·2	−0·2	+0·1	−0·1	
Parsonstown - -	−0·5	0·0	−0·4	−0·2	—	
Valencia - - -	−0·9	−0·6	−0·6	+0·2	—	
Roche's Point -	−0·5	−0·5	−0·5	+0·2	—	
St. Ann's Head -	−0·4	−0·2	−0·5	−0·7	−0·3	
Weekly Weather Report Stations.						
Edgeworthstown -	−0·3	−0·2	−0·4	+0·3	−0·1*	*Kew standard.
Kilkenny - -	—	—	−0·2	0·0	—	
Killarney - -	−0·6	−0·5	−0·2	0·0	—	

Read—(Letters 1717 and 2019) from Mr. Ley, stating that he had recently undergone a severe surgical operation. It was resolved that Captain Toynbee be requested to inspect the stations in England which are in most urgent need of a visit.

Submitted—The following statements of work for the four months July to October 1888:—

Marine Branch.

October 31, 1888.

Examined 65 new logs and 6 lighthouse registers.

Discussion of the cyclones in the Arabian Sea in May and June 1885, and preparing specimen charts showing the conditions which existed on May 30 and June 2.

Discussion of sea temperatures and other data in the neighbourhood of Cape Guardafui in the seven months April to October.

Preparation and extraction of Red Sea data in logs of H.M. ships, supplied by the Admiralty.

Preparation of lecture diagrams, showing the results obtained in the Cape Guardafui inquiry during the prevalence of the S.W. monsoon, June to September; and the results of the discussion

of M.O., Admiralty, and P. & O. data in the Red Sea, in the months of January and July; also descriptive notes of the same for General Strachey's communication to the Geographical Section of the British Association Meeting at Bath. The diagrams also reduced for reproduction in the November Number of the Proceedings of the Royal Geographical Society.

Preparation and charting of currents in all oceans from M.O. and Admiralty logs.

Completing a chart showing the mean barometrical pressure for the year over the sea, deduced from the values for the four months already published.

Drawing a chart of Europe for use in the Telegraph Branch for the Daily and Weekly Weather Reports.

A series of diagrams prepared to illustrate various types of weather formation over the British Isles, for Captain Toynbee's provincial lectures to fishermen, &c.

Examining proof of lithographed variation chart.

Copying observations from a rough book into log No. 7,297.

Tracks of cyclones in the South Indian Ocean during the years 1851, 1852, 1854, and 1855 received from Mr. Meldrum; the remainder, to complete the series, promised at an early date.

Indexing data in ocean 10-degree squares.

(Signed) CHAS. HARDING.

The Marine Superintendent,

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.
(July to October 1888.)

November 1, 1888.

Monthly Weather Report:—

1887, *January* to *April* issued. Remaining months as before.

1888, *January*, ready for press. *February* nearly complete. *March* to *September*. Tables prepared and some rough charts ready.

Weekly Weather Report:—

All numbers issued promptly to date.

Appendix I. (Quarterly Summary) issued to date.

„ *II. to IV.*—Well up to date preparatory to issue at close of year.

Daily Weather Report:—

Numbers have been all issued promptly.

Monthly with summary, corrections and additions. Issued to end of September.

A great deal of time has been spent in rectifying discrepancies which had appeared in the reports from certain stations, resulting in great improvement in the reports from Malin Head, St. Mathieu, Cape Gris Nez, and Cuxhaven.

Inspection Notes for all Scotch and Irish stations have been prepared and issued, and most of them examined on their return.

Plotting of Daily Weather Telegrams from the United States.—Done to middle of August, and also latter half of October.

Investigation as to Prevalence of Fog over the British Islands.—Very little advanced since last report.

Hay Harvest Forecasts, 1888.—Issued regularly from 11th June to 25th August. Several subscribers continued to receive special telegrams later. Checking of same commenced.

Checking of Daily (8.30 *a.m. and* 3.30 *p.m.*) *Forecasts*,—Done to date; summaries complete to end of September.

Primary Checking of Storm Warnings, 1888.—Done to date.

Preparation of New Chart for Working Chart, 1889.—Chart drawn by Lieut. Baillie; examined, engraved, proof carefully revised, *and returned to engraver.*

During this period, the staff in this branch have taken nearly the whole of their holidays, and this has rendered the performance of any but routine work almost an impossibility.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

October 31, 1888.

Observatory Returns.—Proofs of "Hourly Readings" for Part IV., 1885, have been read and revised, and the part published. For Part I., 1886, the whole of the means, &c. have been calculated and the hourly values copied and sent to printer; proofs have been read and signed for press for about two thirds of the part. The calculation of the means for April 1886 is now in hand.

Quarterly Weather Report.—Part IV., 1879, is still in hand, and has been but slightly advanced since last report.

Harmonic Analyser.—The analysis of the barograms for 1880 has been carried as far as Stonyhurst, and about one fourth of the curves for that observatory have been passed through the instrument.

The harmonic coefficients for Greenwich have been obtained for the 20 years barometer observations, and several experimental diagrams of the results have been drawn.

Miscellaneous.—Mr. Bayard's tables of barometric means have been corrected for non-periodicity. The Bunhill Row Sunshine Cards for April–June 1888 tabulated and sent to Royal Meteorological Society. The calculation of the means usually asked for by the Kew Committee for their Annual Report, has been somewhat advanced in anticipation of the usual request. An inspection was made of the vane-brake in the Heligoland anemometer before it was despatched for re-erection. The circular of instructions for adjusting sunshine recorders has been re-written for a new edition.

The usual summer vacation has been taken in the period covered by this report, and owing to the resignation of Mr. H. Brown in August, the staff of the room has since then been reduced.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

October 31, 1888.

Examinations.

September and October, 1886.—Completed.

June to September, 1888.—Partial examination of the Valencia work for the Registrar-General of Ireland.

October (1887) to September (1888).—Kew *barograms* and *thermograms* completed for the Annual Report.

Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

July to October 1886.—Notes of Errors to all stations, and reports thereon to Council.

January to June 1886.—Report on the work for these months.

Investigation *re* Falmouth barograms fiducial point.

Miscellaneous.

Consideration of the "code" of regulations, and system of tabulating barogram curves.

Sorting and packing Thermogram and Barogram Journals 1883–1886, and arranging curves and documents.

Preparing and copying notes of instructions for annual inspection.

Preparing form "25" (Barometer Journal).

Moving and removing, consequent upon the cleaning, &c. of room caused delay, and the annual vacation has been taken by the staff during the period under notice.

(Signed) T. E. ALLEN.

LIST of STORM WARNINGS issued to the COASTS of the BRITISH ISLANDS since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result, as to the Character of the Warning.

(1.) WARNINGS ISSUED.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result.* Character of Warning.
1888.				
July 25th, 9.40 a.m. -	England, S.W. -	South cone	Wind lulled quickly - -	C
" " -	" S. -	"	Moderate to fresh S.Wly. gales evening 25th.	B
" " -	" S.E. (mouth of Thames).	"	Neither gales nor strong winds -	C
	Local depression became shallower as it advanced eastwards.			
July 27th, 9.50 a.m. -	Ireland, S. -	South cone	Moderate Nly. gale night 27th -	B
" " -	" E. -	"	Wind lulled after issue of warnings	C
" " -	England, N.W. (Bangor only).	"	Neither gales nor strong winds -	C

* A = complete success (*i.e.* justified by gales of force 8 or more by Beaufort's scale).
B = partial success (" " strong winds, force 6 or 7 ").
C = failure (" not justified by either gales or strong winds).

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result. Character of Warning.
1888.				
July 27th, 9.50 a.m. -	England, W. -	South cone	Neither gales nor strong winds -	C
„ „ -	„ S.W. -	„	Moderate to fresh Wly. gales morning 28th.	A
„ „ -	„ S. -	„	Moderate to fresh Wly. gales on 28th.	A
„ 10 a.m. -	„ S.E. -	„	Strong S.Ely. winds night of 27th -	B
„ 7.50 p.m. -	Scotland, E. (northern part).	North cone	Neither gales nor strong winds -	C
Aug. 12th, 9.40 a.m. -	Ireland, S. -	South cone	Fresh Sly. gale night of 12th -	A
„ „ -	„ E. -	„	Strong Wly. winds on 13th -	B
„ „ -	Scotland, E. -	„	Strong N.Wly. winds early on 14th	B
„ „ -	„ W. -	„	Moderate Wly. gale on 13th -	B
Aug. 19th, 9.40 a.m. -	Ireland, S. -	South cone	Moderate Sly. gale evening of 19th	B
„ „ -	„ E. -	„	Neither gales nor strong winds -	C
„ „ -	Scotland, W. -	„	„ „ „ -	C
„ „ -	England, N.W. -	„	„ „ „ -	C
„ „ -	„ W. -	„	Strong Sly. winds night of 19th -	B
Aug. 22nd, 7.10 p.m. -	Ireland, S. -	South cone	Fresh to strong Sly. gales on 23rd -	A
„ „ -	England, W. (Bristol Channel).	„	Moderate Sly. gales on 23rd -	B
„ „ -	„ S.W. -	„	Fresh Sly. gales 23rd - -	A
„ „ -	„ S. (Channel Islands and Southampton).	„	Strong Sly. and S.Wly. winds on 23rd.	B
Aug. 23rd, 10 a.m. -	Ireland, E. -	South cone	Moderate S.Wly. gales on 23rd -	B
„ „ -	Scotland, W. -	„	Moderate Sly. gales night of 23rd -	B
„ „ -	England, N.W. -	„	Strong Sly. winds night of 23rd -	B
„ „ -	„ W. (excepting Bristol Channel).	„	„ „ „ -	B
„ 3 p.m. -	Scotland, E. -	„	Strong Sly. winds and moderate gales night of 23rd.	B
Aug. 26th, 9.40. a.m. -	Scotland, E. (northern part).	South cone	Wind lulled after issue of warnings	C
„ „ -	„ W. -	„	Neither gales nor strong winds -	C
Aug. 28th, 3.20 p.m. -	England, S. -	South cone	Fresh Wly. gales night of 28th -	A
„ „ -	„ S.E. -	„	„ „ „ -	A
Sept. 1st, 11 a.m. -	Ireland, E. (northern part).	North cone	Moderate gale at time of issue ; did not increase.	C
„ „ -	Scotland, E. (northern part).	„	Neither gales nor strong winds -	C
„ „ -	„ W. -	„	„ „ „ -	C
„ „ -	England, N.W. (northern part).	„	„ „ „ -	C
„ 11.40 a.m. -	Ireland, S. -	„	Strong S.Wly. winds in evening -	B
„ „ -	„ E. (southern part).	„	Neither gales nor strong winds -	C
„ „ -	Scotland, E. (southern part).	„	„ „ „ -	C
„ „ -	England, N.W. (southern part).	„	„ „ „ -	C
„ „ -	„ W. -	„	„ „ „ -	C
„ „ -	„ E. (northern part).	„	„ „ „ -	C
	The impression was, in issuing these warnings, that the depression which lay off our N.Wn. coasts at 8 a.m. on 1st was moving S.Ewds., whereas it was only spreading out in that direction. Special report from Donaghadee, 11 a.m. confirmed this view.			
Sept. 9th, 9.30 a.m. -	England, S.W. -	North cone	Neither gales nor strong winds -	C
„ „ -	„ S. -	„	„ „ „ -	C
„ „ -	„ S.E. -	„	„ „ „ -	C
„ „ -	„ E. (southern part).	„	„ „ „ -	C

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any) and approximate Time of Occurrence.	Result. — Character of Warning.
Sept. 27th, 7 p.m. -	Ireland, S. - -	South cone	Wind lulled from time of issue of warnings.	C
„ „ -	„ E. -	„	„ „ „ -	C
„ „ -	England, N.W. (Bangor only).	„	Neither gale nor strong wind -	C
„ „ -	„ W. -	„	„ „ „ -	C
„ „ -	„ S.W. -	„	Wind lulled after issue of warning -	C
The appearance of maps for 6 p.m. 27th was so threatening that we dare not have left the coasts unwarned, and yet the system collapsed entirely soon after warnings were issued.				
Oct. 1st, 7.0 p.m. -	Scotland, E. (northern part).	North cone	Strong N. to N.E. winds continued but apparently did not increase.	C
„ 7.40 p.m. -	Ireland, E.† -	„	Strong Nly. winds on 2nd - -	B
„ „ -	Scotland, W.† -	„	Fresh Nly. gale on 2nd - -	A
„ „ -	England, N.W. -	„	No gale or strong wind - -	C
Oct. 2nd, 10.30 a.m. -	Ireland, S. - -	North cone	Nly. gale in W. of Ireland - -	A
„ „ -	England, W. -	„	Neither gale nor strong wind -	C
„ „ -	„ S.W. -	„	„ „ „ -	C
Oct. 4th, 10.20 a.m. -	Ireland, E. - -	North cone	Moderate gale from Nwd. on 4th -	B
„ „ -	Scotland, E. (northpart).	„	Fresh Nly. gale, night of 4th -	A
„ -	„ W. -	„	Moderate N. & N.W. gales night of 4th.	B
„ „ -	England, N.W. -	„	„ „ on 5th	B
„ 7.0 p.m. -	Ireland, S.† -	„	Neither gales nor strong winds -	C
„ „ -	Scotland, E. (southern part).	„	Strong N.Wly. gale, afternoon 5th -	A
„ „ -	England, W.† -	„	Strong N.Wly. winds, night of 4th -	B
„ „ -	„ S.W. -	„	„ „ „ -	B
„ „ -	„ E. (northern part).	„	Apparently no increase of wind -	C
„ 7.30 p.m. -	„ S. -	„	Strong winds from Wwd and severe local squalls.	B
„ „ -	„ S.E. -	„	Neither gale nor strong wind -	C
„ „ -	„ E. (southern part).	„	No increase of wind - -	C
Oct. 11th, 3.10 p.m. -	Scotland, E. (Shetland and Caithness).	North cone	Fresh Wly. gale on night of 11th -	A
Oct. 14th, 9.30 a.m. -	Scotland, E. -	North cone	Neither gale nor strong wind -	C
„ „ -	„ W. -	„	„ „ „ -	C
Oct. 18th, 3.30 p.m. -	Ireland, S. - -	South cone	No further increase of wind (from 7) prevaling at time.	C
Oct. 24th, 7.20 p.m. -	Ireland, S. - -	South cone	Fresh to strong Sly. gales night of 25–26th.	A
„ „ -	„ E.† -	„	Strong Sly. winds, 25th and 26th -	B
„ „ -	Scotland, W.† -	„	„ „ „ -	B
Oct. 27th, 3.20 p.m. -	Scotland, E. -	South cone	Strong S.Wly. winds and mod. gales on night of 28th.	B
„ „ -	„ W. -	„	„ „ „ -	B
„ „ -	England, E. (northern part).	„	„ „ „ -	B

† Information at present available for these coasts insufficient to give reliable results.

SUMMARY.

(A + B) - - - - -	41
(C) - - - - -	40

(2.) GALES EXPERIENCED WITHOUT WARNING.

None.—That prevailing in the west of Ireland on the 27th October was merely a continuation of gale of 25–26th.

(Signed) FREDC. GASTER.

Telegraphic Branch,
31st October 1888.

Submitted—The following report on the forecasts for July, August, and September, 1888:—

The letters used have the following signification:—

a=complete success.
b=partial (*i.e.*, more than half) success.
c=partizi failure.
d=total failure.

JULY.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	58	50	54	79
,,	b	31	19	25	
,,	c	7	12	10	
,,	d	4	19	11	
SCOTLAND, E.	a	62	42	52	79
,,	b	19	35	27	
,,	c	19	15	17	
,,	d	0	8	4	
ENGLAND, N.E.	a	46	35	41	79
,,	b	31	46	38	
,,	c	4	15	10	
,,	d	19	4	11	
ENGLAND, E.	a	58	42	50	73
,,	b	19	27	23	
,,	c	12	19	16	
,,	d	11	12	11	
MIDLAND COS.	a	54	42	48	81
,,	b	35	31	33	
,,	c	4	27	16	
,,	d	7	0	3	
ENGLAND, S.	a	42	50	46	81
,,	b	50	19	35	
,,	c	8	23	15	
,,	d	0	8	4	
SCOTLAND, W.	a	50	35	43	75
,,	b	23	42	32	
,,	c	23	4	14	
,,	d	4	19	11	
ENGLAND, N.W.	a	39	42	41	77
,,	b	38	35	36	
,,	c	19	19	19	
,,	d	4	4	4	
ENGLAND, S.W.	a	42	54	48	75
,,	b	31	23	27	
,,	c	19	19	19	
,,	d	8	4	6	
IRELAND, N.	a	28	54	41	75
,,	b	40	27	34	
,,	c	20	19	19	
,,	d	12	0	6	
IRELAND, S.	a	48	46	47	77
,,	b	24	35	30	
,,	c	20	15	17	
,,	d	8	4	6	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	65	49	57	85
,,	b	26	29	28	
,,	c	9	16	12	
,,	d	0	6	3	
SCOTLAND, E.	a	61	49	55	87
,,	b	29	35	32	
,,	c	7	10	9	
,,	d	3	6	4	
ENGLAND, N.E.	a	55	42	49	87
,,	b	32	45	38	
,,	c	3	7	5	
,,	d	10	6	8	
ENGLAND, E.	a	42	55	49	78
,,	b	29	29	29	
,,	c	23	10	16	
,,	d	6	6	6	
MIDLAND COS.	a	45	52	49	80
,,	b	36	26	31	
,,	c	13	22	17	
,,	d	6	0	3	
ENGLAND, S.	a	52	65	59	83
,,	b	32	16	24	
,,	c	10	13	11	
,,	d	6	6	6	
SCOTLAND, W.	a	32	52	42	78
,,	b	42	26	34	
,,	c	16	16	16	
,,	d	10	6	8	
ENGLAND, N.W.	a	45	58	52	86
,,	b	45	23	34	
,,	c	7	16	11	
,,	d	3	3	3	
ENGLAND, S.W.	a	52	65	59	93
,,	b	42	26	34	
,,	c	6	3	4	
,,	d	0	6	3	
IRELAND, N.	a	32	58	45	74
,,	b	29	29	29	
,,	c	20	10	15	
,,	d	19	3	11	
IRELAND, S.	a	49	61	55	75
,,	b	19	20	20	
,,	c	19	6	12	
,,	d	13	13	13	

SUMMARY.

BRITISH ISLES	a	48	45	47	78	BRITISH ISLES	a	48	55	52	82
,,	b	31	31	31		,,	b	33	28	30	
,,	c	14	17	15		,,	c	12	12	12	
,,	d	7	7	7		,,	d	7	5	6	

The letters used have the following signification :—

a=complete success.
b=partial (*i.e.*, more than half) success.
c=partial failure.
d=total failure.

AUGUST.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	37	56	47	84
,,	b	48	26	37	
,,	c	8	7	7	
,,	d	7	11	9	
Scotland, E.	a	44	52	48	87
,,	b	48	30	39	
,,	c	4	11	8	
,,	d	4	7	5	
England, N.E.	a	37	48	43	82
,,	b	52	26	39	
,,	c	7	15	11	
,,	d	4	11	7	
England, E.	a	59	37	48	80
,,	b	33	30	32	
,,	c	4	22	13	
,,	d	4	11	7	
Midland Cos.	a	59	41	50	86
,,	b	30	41	36	
,,	c	4	15	9	
,,	d	7	3	5	
England, S.	a	52	41	47	82
,,	b	37	33	35	
,,	c	4	15	9	
,,	d	7	11	9	
Scotland, W.	a	45	42	44	83
,,	b	48	31	39	
,,	c	4	23	14	
,,	d	3	4	3	
England, N.W.	a	44	27	36	70
,,	b	30	38	34	
,,	c	19	27	23	
,,	d	7	8	7	
England, S.W.	a	30	46	38	72
,,	b	44	23	34	
,,	c	7	19	13	
,,	d	19	12	15	
Ireland, N.	a	19	42	31	68
,,	b	33	42	37	
,,	c	30	8	19	
,,	d	18	8	13	
Ireland, S.	a	22	41	32	71
,,	b	41	37	39	
,,	c	26	22	24	
,,	d	11	0	5	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	62	55	59	88
,,	b	32	26	29	
,,	c	3	19	11	
,,	d	3		1	
Scotland, E.	a	58	58	58	84
,,	b	32	20	26	
,,	c	7	16	12	
,,	d	3	6	4	
England, N.E.	a	49	49	49	93
,,	b	45	42	44	
,,	c	0	3	1	
,,	d	6	6	6	
England, E.	a	52	33	43	89
,,	b	45	47	46	
,,	c	0	10	5	
,,	d	3	10	6	
Midland Cos.	a	61	30	46	84
,,	b	29	47	38	
,,	c	3	20	11	
,,	d	7	3	5	
England, S.	a	74	43	59	87
,,	b	23	33	28	
,,	c	0	17	8	
,,	d	3	7	5	
Scotland, W.	a	52	42	47	89
,,	b	48	35	42	
,,	c	0	10	5	
,,	d	0	13	6	
England, N.W.	a	45	36	41	88
,,	b	49	45	47	
,,	c	6	6	6	
,,	d	0	13	6	
England, S.W.	a	45	42	44	82
,,	b	45	32	38	
,,	c	7	23	15	
,,	d	3	3	3	
Ireland, N.	a	32	52	42	81
,,	b	45	32	39	
,,	c	16	6	11	
,,	d	7	10	8	
Ireland, S.	a	36	52	44	77
,,	b	39	26	33	
,,	c	19	19	19	
,,	d	6	3	4	

SUMMARY.

British Isles	a	41	43	42	78
,,	b	40	32	36	
,,	c	11	17	14	
,,	d	8	8	8	
British Isles	a	51	45	48	85
,,	b	39	35	37	
,,	c	6	13	10	
,,	d	4	7	5	

The letters used have the following signification :—

a=complete success.
b=partial (*i.e.*, more than half) success.
c=partial failure.
d=total failure.

SEPTEMBER.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	32	54	43	80
,,	b	52	21	37	
,,	c	12	21	16	
,,	d	4	4	4	
SCOTLAND, E.	a	44	46	45	78
,,	b	36	29	33	
,,	c	16	21	18	
,,	d	4	4	4	
ENGLAND, N.E.	a	52	40	46	76
,,	b	28	32	30	
,,	c	20	16	18	
,,	d	0	12	6	
ENGLAND, E.	a	52	68	60	94
,,	b	44	24	34	
,,	c	4	0	2	
,,	d	0	8	4	
MIDLAND COS.	a	56	72	64	90
,,	b	40	12	26	
,,	c	4	8	6	
,,	d	0	8	4	
ENGLAND, S.	a	60	80	70	90
,,	b	32	8	20	
,,	c	8	8	8	
,,	d	0	4	2	
SCOTLAND, W.	a	32	32	32	76
,,	b	48	40	44	
,,	c	16	8	12	
,,	d	4	20	12	
ENGLAND, N.W.	a	40	48	44	86
,,	b	44	40	42	
,,	c	8	4	6	
,,	d	8	8	8	
ENGLAND, S.W.	a	60	72	66	90
,,	b	28	20	24	
,,	c	12	4	8	
,,	d	0	4	2	
IRELAND, N.	a	32	56	44	88
,,	b	56	32	44	
,,	c	4	8	6	
,,	d	8	4	6	
IRELAND, S.	a	48	52	50	72
,,	b	16	28	22	
,,	c	24	12	18	
,,	d	12	8	10	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	30	50	40	82
,,	b	53	30	42	
,,	c	10	13	11	
,,	d	7	7	7	
SCOTLAND, E.	a	47	57	52	87
,,	b	40	30	35	
,,	c	10	10	10	
,,	d	3	3	3	
ENGLAND, N.E.	a	53	60	57	85
,,	b	37	20	28	
,,	c	7	10	9	
,,	d	3	10	6	
ENGLAND, E.	a	50	57	54	94
,,	b	40	40	40	
,,	c	7	3	5	
,,	d	3	0	1	
MIDLAND COS.	a	43	73	58	85
,,	b	37	17	27	
,,	c	17	7	12	
,,	d	3	3	3	
ENGLAND, S.	a	50	73	62	90
,,	b	40	17	28	
,,	c	10	10	10	
,,	d	0	0	0	
SCOTLAND, W.	a	37	50	44	81
,,	b	47	27	37	
,,	c	16	10	13	
,,	d	0	13	6	
ENGLAND, N.W.	a	47	50	49	74
,,	b	27	23	25	
,,	c	23	10	16	
,,	d	3	17	10	
ENGLAND, S.W.	a	50	57	54	87
,,	b	33	33	33	
,,	c	17	0	8	
,,	d	0	10	5	
IRELAND, N.	a	40	63	52	89
,,	b	47	27	37	
,,	c	10	7	8	
,,	d	3	3	3	
IRELAND, S.	a	50	54	52	74
,,	b	20	23	22	
,,	c	17	10	13	
,,	d	13	13	13	

SUMMARY.

BRITISH ISLES	a	46	56	51	83
,,	b	38	26	32	
,,	c	12	10	11	
,,	d	4	8	6	
BRITISH ISLES	a	45	59	52	84
,,	b	38	26	32	
,,	c	13	8	11	
,,	d	4	7	5	

Reported—That the following cheques had been drawn for July:—

1888.		£	s.	d.
July 7th.	J. S. Harding, jun., for payment of weekly salaries	15	16	0
„ 11th.	E. Higgs, repairs, &c. in Office	5	10	6
„ „	Hopkin and Williams, chemicals	3	14	5
„ „	Kew Committee, photographic paper	6	7	0
„ „	R. Strachan, pocket registers	4	7	6
„ „	J. C. Taylor, Aberdeen reporter	3	5	0
„ „	Negretti & Zambra, instruments and repairs	164	1	8
„ 14th.	J. S. Harding, jun., for payment of weekly salaries	15	16	0
„ 17th.	Bank of England, sale of S.O. forms	2	15	10
„ „	Gas Light and Coke Co., gas	3	2	11
„ „	Pall Mall Co., coals	14	5	0
„ „	H. Bond, repairs, &c. in Office	11	7	4
„ 21st.	J. S. Harding, jun., for payment of weekly salaries	15	16	0
„ 28th.	„ „ „	15	16	0
„ 31st.	R. H. Scott, Secretary	66	13	4
„ „	J. S. Harding } Office salaries	27	15	6
„ „	T. D. Bell } Office salaries	16	5	0
„ „	J. Sheerman, salary, harmonic analysis	11	5	0
„ „	J. E. Cullum, salary (Valencia Observatory)	19	3	4
„ „	R. H. Curtis } Salaries (discussion, &c. of observations)	22	18	4
„ „	J. A. Curtis } Salaries (discussion, &c. of observations)	18	15	0
„ „	T. E. Allen } Salaries (discussion, &c. of observations)	16	13	4
„ „	C. H. Thompson } Salaries (discussion, &c. of observations)	12	10	0
„ „	S. Call } Salaries (discussion, &c. of observations)	12	1	8
„ „	R. G. Canham } Salaries (discussion, &c. of observations)	7	18	4
„ „	A. H. Bell } Salaries (discussion, &c. of observations)	7	18	4
„ „	L. H. Powers } Salaries (discussion, &c. of observations)	4	11	8
„ „	F. Gaster } Salaries (preparation, &c. of Weather Reports)	25	15	7
„ „	F. J. Brodie } Salaries (preparation, &c. of Weather Reports)	18	15	0
„ „	G. G. Francis } Salaries (preparation, &c. of Weather Reports)	18	5	7
„ „	A. J. Rigby } Salaries (preparation, &c. of Weather Reports)	17	16	3
„ „	R. Sargeant } Salaries (preparation, &c. of Weather Reports)	12	13	1
„ „	A. R. Simpkins } Salaries (preparation, &c. of Weather Reports)	10	6	3
„ „	C. W. Heinemann } Salaries (preparation, &c. of Weather Reports)	5	8	4
„ „	Capt. H. Toynbee } Salaries (discussion, &c. of observations, and care of instruments)	33	6	8
„ „	Nav.-Lieut. C. W. Baillie, R.N. } Salaries (discussion, &c. of observations, and care of instruments)	22	18	4
„ „	R. Strachan } Salaries (discussion, &c. of observations, and care of instruments)	27	15	6
„ „	C. Harding } Salaries (discussion, &c. of observations, and care of instruments)	22	18	4
„ „	H. Harries } Salaries (discussion, &c. of observations, and care of instruments)	15	8	4
„ „	W. Allingham } Salaries (discussion, &c. of observations, and care of instruments)	15	8	4
„ „	W. G. James } Salaries (discussion, &c. of observations, and care of instruments)	11	13	4
„ „	F. T. Bullen } Salaries (discussion, &c. of observations, and care of instruments)	9	3	4
„ „	R. F. Wallace } Salaries (discussion, &c. of observations, and care of instruments)	9	3	4
„ „	J. A. Curtis, discussion of old observations	7	14	0
„ „	J. E. Cullum, expenses, Valencia Observatory	19	16	2
„ „	F. Gaster, for payment of allowances for extra attendance	17	12	3
„ „	Postmaster General, telegrams	110	12	9
„ „	J. J. Hicks, fishery barometers, &c.	24	6	6
„ „	D. McGregor & Co., Glasgow agents	6	18	7
„ „	C. Harding, for payment of accounts for work done for Utrecht M.O.	17	15	0
„ „	J. S. Harding, jun., petty cash	50	0	0
		£1,058	0	10

For August:—

1888.			£	s.	d.
Aug.	4th.	J. S. Harding, jun., for payment of weekly salaries	15	16	0
,,	,,	Hamburg M.O., telegrams	*17	16	0
,,	11th.	J. S. Harding, jun., for payment of weekly salaries	15	16	0
,,	13th.	Paris M.O., telegrams	*1	18	8
,,	18th.	J. S. Harding, jun., for payment of weekly salaries	15	16	0
,,	24th.	T. E. Allen, for payment of accounts for tabulation of Aberdeen curves	5	5	0
,,	,,	Postmaster General, telegrams	95	15	11
,,	25th.	J. S. Harding, jun., for payment of weekly salaries	15	16	0
,,	29th.	R. H. Scott, petty cash account	25	0	0
,,	31st	R. H. Scott, Secretary	66	13	4
,,	,,	J. S. Harding, jun. — Office salaries	27	15	6
,,	,,	T. D. Bell — Office salaries	16	5	0
,,	,,	Captain H. Toynbee, pension	12	0	0
,,	,,	J. Sheerman, salary (harmonic analysis)	11	5	0
,,	,,	J. E. Cullum ,, (Valencia Observatory)	19	3	4
,,	,,	R. H. Curtis — Salaries (discussion, &c. of observations)	22	18	4
,,	,,	J. A. Curtis — Salaries (discussion, &c. of observations)	18	15	0
,,	,,	T. E. Allen — Salaries (discussion, &c. of observations)	16	13	4
,,	,,	C. H. Thompson — Salaries (discussion, &c. of observations)	12	10	0
,,	,,	S. Call — Salaries (discussion, &c. of observations)	12	1	8
,,	,,	R. G. Canham — Salaries (discussion, &c. of observations)	7	18	4
,,	,,	A. H. Bell — Salaries (discussion, &c. of observations)	7	18	4
,,	,,	L. H. Powers — Salaries (discussion, &c. of observations)	4	11	8
,,	,,	F. Gaster — Salaries (preparation, &c. of Weather Reports)	25	15	7
,,	,,	F. J. Brodie — Salaries (preparation, &c. of Weather Reports)	18	15	0
,,	,,	G. G. Francis — Salaries (preparation, &c. of Weather Reports)	18	5	7
,,	,,	A. J. Rigby — Salaries (preparation, &c. of Weather Reports)	17	16	3
,,	,,	R. Sargeant — Salaries (preparation, &c. of Weather Reports)	12	13	1
,,	,,	A. R. Simpkins — Salaries (preparation, &c. of Weather Reports)	10	6	3
,,	,,	C. W. Heinemann — Salaries (preparation, &c. of Weather Reports)	5	8	4
,,	,,	Nav. Lieut. C. W. Baillie, R.N. — Salaries (discussion, &c. of observations and care of instruments)	29	3	4
,,	,,	R. Strachan — Salaries (discussion, &c. of observations and care of instruments)	27	15	6
,,	,,	C. Harding — Salaries (discussion, &c. of observations and care of instruments)	22	18	4
,,	,,	H. Harries — Salaries (discussion, &c. of observations and care of instruments)	15	8	4
,,	,,	W. Allingham — Salaries (discussion, &c. of observations and care of instruments)	15	8	4
,,	,,	W. G. James — Salaries (discussion, &c. of observations and care of instruments)	11	13	4
,,	,,	F. T. Bullen — Salaries (discussion, &c. of observations and care of instruments)	9	3	4
,,	,,	R. F. Wallace — Salaries (discussion, &c. of observations and care of instruments)	9	3	4
,,	,,	G. A. Gillett, wood, oil, &c.	2	1	6
,,	,,	Wightman & Co., printing, &c.	10	12	0
,,	,,	O'Driscoll & Sons, rent of land for electrical anemometer	7	10	0
,,	,,	R. W. Munro, repairing anemometers	12	10	6
,,	,,	J. E. Cullum, expenses at Valencia	12	19	9
,,	,,	F. Gaster, for payment of allowances for extra attendance	16	16	11
,,	,,	C. Harding, for payment of accounts for extraction of observations for Utrecht	10	1	3
,,	,,	J. S. Harding, jun., petty cash	50	0	0
			£837	14	3

* Paid by draft on a foreign banker.

For September :—

1888.			£	s.	d.
Sept. 1st.	J. S. Harding, jun., for payment of weekly salaries		14	14	0
„ „	Capt. H. Toynbee, inspections		21	4	5
„ 8th.	J. S. Harding, jun., for payment of weekly salaries		14	10	8
„ 11th.	Paris M.O., telegrams		*4	4	11
„ 15th.	R. H. Scott, petty cash account		40	0	0
„ „	Postmaster-General, telegrams		125	6	7
„ „	J. S. Harding, jun., for payment of weekly salaries		14	18	0
„ 22nd.	„ „ „		14	18	0
„ 29th.	„ „ „		14	18	0
„ „	R. H. Scott, Secretary		66	13	4
„ „	J. S. Harding, jun. } Office salaries		27	15	6
„ „	T. D. Bell } Office salaries		16	5	0
„ „	J. E. Cullum, salary (Valencia Observatory)		19	3	4
„ „	R. H. Curtis } Salaries (discussion, &c. of observations).		22	18	4
„ „	J. A. Curtis } Salaries (discussion, &c. of observations).		18	15	0
„ „	T. E. Allen } Salaries (discussion, &c. of observations).		16	13	4
„ „	C. H. Thompson } Salaries (discussion, &c. of observations).		12	10	0
„ „	S. Call } Salaries (discussion, &c. of observations).		12	1	8
„ „	R. G. Canham } Salaries (discussion, &c. of observations).		7	18	4
„ „	A. H. Bell } Salaries (discussion, &c. of observations).		7	18	4
„ „	L. H. Powers } Salaries (discussion, &c. of observations).		4	11	8
„ „	F. Gaster } Salaries (preparation, &c. of Weather Reports).		25	15	7
„ „	F. J. Brodie } Salaries (preparation, &c. of Weather Reports).		18	15	0
„ „	G. G. Francis } Salaries (preparation, &c. of Weather Reports).		18	5	7
„ „	A. J. Rigby } Salaries (preparation, &c. of Weather Reports).		17	16	3
„ „	R. Sargeant } Salaries (preparation, &c. of Weather Reports).		12	13	1
„ „	A. R. Simpkins } Salaries (preparation, &c. of Weather Reports).		10	6	3
„ „	C. W. Heinemann } Salaries (preparation, &c. of Weather Reports).		5	8	4
„ „	Nav.-Lt. C. W. Baillie, R.N. } Salaries (discussion, &c. of observations and care of instruments).		29	3	4
„ „	R. Strachan } Salaries (discussion, &c. of observations and care of instruments).		27	15	6
„ „	C. Harding } Salaries (discussion, &c. of observations and care of instruments).		22	18	4
„ „	H. Harries } Salaries (discussion, &c. of observations and care of instruments).		15	8	4
„ „	W. Allingham } Salaries (discussion, &c. of observations and care of instruments).		15	8	4
„ „	W. G. James } Salaries (discussion, &c. of observations and care of instruments).		11	13	4
„ „	F. T. Bullen } Salaries (discussion, &c. of observations and care of instruments).		9	3	4
„ „	R. F. Wallace } Salaries (discussion, &c. of observations and care of instruments).		9	3	4
„ „	G. J. Mayhew, rent		158	15	0
„ „	Pickford & Co., carriage of parcels		3	15	14
„ „	Capt. H. Toynbee, pension	12 0 0			
„ „	J. S. Harding, senr., pension	10 14 1			
			22	14	1
„ „	J. Sheerman, salary (harmonic analysis)		11	5	0
„ „	H. Williams, care of bridled anemometer	2 10 3			
„ „	„ care of Robinson's anemometer	2 11 3			
			5	1	6
„ „	C. Niven, Aberdeen Observatory	69 9 0			
„ „	J. L. E. Dreyer, Armagh „	12 10 0			
„ „	W. L. Fox, Falmouth „	62 8 6			
„ „	Fleetwood Improvement Commissioners, care of anemometer	2 10 0			
„ „	R. Grant, Glasgow observatory	18 9 3			
„ „	Kew Committee, allowance for quarter	100 0 0			
„ „	W. Harrison, care of N. Shields anemometer	3 4 4			
	Carried forward	£268 11 1	950	3	3

* Paid by draft on a foreign banker.

		£	s.	d.	£	s.	d.
1888.	Brought forward -	268	11	1	950	3	3
Sept. 29th.	W. I. Fortescue, care of Orkney anemometer	2	10	0			
„ „	S. J. Perry, Stonyhurst observatory -	13	14	3			
„ „	J. E. Cullum, Valencia „ -	14	2	3			
					298	17	7
„ „	G. T. Watson, care of Yarmouth anemometer - - -	3	19	0			
„ „	„ meteorological reports -	4	3	0			
					8	2	0
„ „	W. Boswell, Aberdeen - - -	6	10	0			
„ „	H. Todd, Cambridge - - -	4	11	0			
„ „	H. Mohn, Christiania - - -	5	10	0			
„ „	P. Curnow, Dungeness - - -	4	11	6			
„ „	W. Brand, Dunrossness - - -	3	18	9			
„ „	W. H. Bunce, Hawes Junction - -	1	19	3			
„ „	S. Richards, Holyhead - - -	3	19	4			
„ „	G. G. Appleton, Hurst Castle - -	3	18	3			
„ „	J. Fisher, Jersey - - -	4	0	6			
„ „	F. Gaster, London - - -	3	18	0			
„ „	W. Berridge, Loughborough - -	3	5	5			
„ „	Secretary of Lloyd's, for Malin Head -	4	17	6			
„ „	K. Kerr, Mullaghmore - - -	5	5	0			
„ „	A. Penny, Nairn - - -	4	4	6			
„ „	W. Wickham, Oxford - - -	3	11	6			
„ „	O. Boeddicker, Parsonstown - -	3	5	0			
„ „	W. Hewitt, Prawle Point - -	3	5	0			
„ „	S. Blake, St. Ann's Head - -	3	11	6			
„ „	W. Thomas, Scilly - - -	6	11	8			
„ „	J. B. Smith, Spurn Head - -	2	18	2			
„ „	J. Forbes, Stornoway - - -	5	12	6			
„ „	J. Sinclair, Wick - - -	3	5	0			
„ „	F. Guy, York - - - -	3	18	0			
					96	7	4
„ „	Postmaster-General, private wire -	-		-	20	15	0
„ „	J. R. Jones, Aberdeen agent - -	1	6	7			
„ „	J. Fowler, Cardiff agent - - -	2	1	0			
„ „	L. Allen, Dundee „ - - -	1	5	7			
„ „	Z. Scaping, Hull „ - - -	3	7	6			
„ „	J. Gill, Liverpool „ - - -	18	16	11			
„ „	D. Forbes, Southampton agent - -	13	1	10			
					39	19	5
„ „	P. Adie, repairing instruments, "A." account	4	12	6			
„ „	„ „ "B" „	5	2	6			
„ „	„ „ "M.O." „	1	2	6			
					10	17	6
„ „	J. H. Woodstock, packing cases - -			-	2	2	6
„ „	F. Gaster, for payment of allowance for extra attendance for telegraphy - - - - -				17	14	10
„ „	J. A. Curtis, for payment of accounts for preparation of observations for Chief Signal Officer - - -				2	2	0
„ „	J. S. Harding, jun., petty cash - - - -				40	0	0
					£1,486	1	5

For October :—

1888.			£	s.	d.
Oct.	6th.	J. S. Harding, junr., for payment of weekly salaries -	14	18	0
„	13th.	„ „ „ -	14	18	0
„	18th.	E. Mascart. French telegrams* - - -	4	2	10
„	19th.	Williams and Norgate, books - - - -	4	5	8
„	„	Kew Committee, verifications, &c. - - -	70	13	9
„	„	R. W. Munro, experimental anemometer and repairs -	57	18	7
„	„	Postmaster-General, telegrams - - - -	170	15	2
„	„	Hon. R. Abercromby, inspecting fishery barometers -	8	1	1
„	20th.	J. S. Harding, junr., for payment of weekly salaries -	14	18	0
„	26th.	Gas Light and Coke Co., gas - - - -	3	3	0
„	„	H. Bond, office repairs - - - - -	60	7	0
„	„	Royal Meteorological Society, observations - -	25	14	3
„	„	Negretti and Zambra, instruments and repairs - -	219	18	4
„	„	D. McGregor and Co., Glasgow agents - - -	4	0	0
„	27th.	J. S. Harding, junr., for payment of weekly salaries -	14	18	0
„	31st.	R. H. Scott, secretary - - - - -	66	13	4
„	„	J. S. Harding, junr. - - } Office salaries - -	27	15	6
„	„	T. D. Bell - - - }	16	5	0
„	„	Captain H. Toynbee, pension - - - -	12	0	0
„	„	J. Sheerman, harmonic analysis - - - -	11	5	0
„	„	J. E. Cullum, salary (Valencia observatory) - -	19	3	4
„	„	R. H. Curtis - - -	22	18	4
„	„	J. A. Curtis - - -	18	15	0
„	„	T. E. Allen - - -	16	13	4
„	„	C. H. Thompson - - Salaries (discussion,	12	10	0
„	„	S. Call - - - &c. of observations).	12	1	8
„	„	R. G. Canham - -	7	18	4
„	„	A. H. Bell - - -	7	18	4
„	„	L. H. Powers - - -	4	11	8
„	„	F. Gaster - - -	25	15	7
„	„	F. J. Brodie - - -	18	15	0
„	„	G. G. Francis - - - Salaries (preparation,	18	5	7
„	„	A. J. Rigby - - - } &c. of Weather {	17	16	3
„	„	R. Sargeant - - - Reports).	12	13	1
„	„	A. R. Simpkins - -	10	6	3
„	„	C. W. Heinemann - -	5	8	4
„	„	Nav.-Lieut. C. W. Baillie, R.N.	29	3	4
„	„	R. Strachan - - -	27	15	6
„	„	C. Harding - - - Salaries (discussion,	22	18	4
„	„	H. Harries - - - &c. of observations	15	8	4
„	„	W. Allingham - - and care of instru-	15	8	4
„	„	W. G. James - - - ments).	11	13	4
„	„	F. T. Bullen - - -	9	3	4
„	„	R. F. Wallace - - -	9	3	4
„	„	J. E. Cullum, Valencia expenses - - -	12	15	3
„	„	F. Gaster, for payment of allowances for extra attendance	15	15	3
„	„	J. S. Harding, jun., petty cash - - - -	65	0	0
			£1,288	4	11

Reported—That the accounts for the six months ended the 31st March 1888 had been audited by the Chairman and Mr. Stone on the 17th July, and had been sent to the Treasury for the Audit Office. The receipts for the six months, exclusive of a balance of 2,815*l.* 12*s.* 8*d.* on the 1st October 1887, amounted to 8,722*l.* 10*s.* 2*d.* The payments amounted to 8,576*l.* 16*s.* 11*d.*, leaving a balance of 2,961*l.* 4*s.* 11*d.* in hand and at the bank on the 1st April last.

* Paid by draft on a foreign banker.

Submitted—The following statement of accounts for the six months ending 30t September 1888:—

Income.	£ s. d.	£ s. d.
Balance from year 1886–87	- - -	2,649 7 1
Proportion of vote for six months	- - -	7,650 0 0
Repayment of expenses charged under—		
Incidental expenses	- - -	9 12 11
Supply of Weather Information:		
D.W. Charts and Forecasts	124 0 1	
6 p.m. Charts	12 10 0	
Information for Press Agencies, &c.	47 15 6	
Telegrams	134 0 9	
		318 6 4
Sale of Instruments, &c.:		
Royal Navy account	13 5 0	
Mercantile Marine account	15 16 1	
		29 1 1
Commission charged on work done for Colonies, &c.	- - -	15 8 0
		£10,671 15 5

Expenditure.	£ s. d.	£ s. d.
Administration:		
Payment of Council	500 0 0	
Secretary	400 0 0	
Salaries and wages	400 7 0	
Rent, fuel, and lighting	345 7 5	
Furniture and fittings	80 4 9	
Incidental and contingent expenses	178 18 3	
Pensions	45 8 2	
Expenses incidental to International Meteorological Congress	21 17 3	
		1,972 2 10
Special Researches	- - -	270 3 1
Land Meteorology:		
Observatories and stations	917 16 0	
Discussion and reduction of observations	665 16 0	
		1,583 12 0
Weather Information and Forecasts:		
Telegraphic reports and storm warnings	1,265 6 4	
Preparation and issue of reports and forecasts	838 8 6	
		2,103 14 10
Inspections:		
Salaries and travelling*	- - -*	236 12 0
Ocean Meteorology:		
Discussion and reduction of observations	892 15 8	
Expenses incidental to the supply of instruments:		
Proportion for care and issue of instruments	100 0 0	
Royal Navy	302 12 8	
Mercantile Marine	217 3 4	
Distant stations	23 13 9	
		1,536 5 5
Balance	- - -	2,969 5 3
		£10,671 15 5

Liabilities.	£ s. d.	Assets.	£ s. d.
To Council	500 0 0	By cash at Bank	3,473 14 11
„ outstanding accounts or work uncompleted	313 4 6	„ „ at Office	108 13 1
„ Post Office (estimated)	270 15 2	„ H.M. Exchequer	650 0 0
„ sundry creditors	561 6 11	„ sundry debtors	382 3 10
„ balance	2,969 5 3		
	£4,614 11 10		£4,614 11 10

* Some expenses under this head not yet brought to account.

116, *Victoria Street, November* 21, 1888.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN. | MR. GALTON.
PROFESSOR DARWIN. | MR. STONE.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (October 31) were read and confirmed.

Read—Letter 1636, dated November 2, from Mr. Whitehead, stating that his estimate of 25*l.* for the total cost of the proposed Corn Harvest Forecasts had been based on the statement contained in the letter from the Office of July 21 (Minutes, p. 42), in which the probable cost of each station had been given at 15*s.*

It was resolved that the subject be taken up again in the Spring of 1889.

The subject of the electrical anemometer at Valencia (Minutes, p. 43) was again considered, further correspondence with Mr. Cullum (Letters 2107 and 2258, and P.C. 2240) having been laid before the Council, the instruction recorded at last meeting was rescinded, and the matter will be reconsidered after a further report from Mr. Cullum.

Mr. Scott submitted the following analysis of the reports of inspection of Fishery Barometers, as directed at last meeting, and also of Mr. Dickson's report on the barometers on the west coast of Scotland which had been subsequently received. (Letter 2233.) (Minutes, p. 29.)

FISHERY BAROMETERS.

ABSTRACT.—MR. ABERCROMBY.

Station.	Situation.	Condition.	Recommendations.
Lynn - -	Custom house -	Hung in Long Room. Bad light. Too high. Said to be useless.	Change suggested to harbour-master's office.
„ - -	Dock office - -	In good order - -	Change suggested to dock gate.
Wells - -	Mr. Marriott's office	Read regularly. No chart kept.	——
Gorleston, Yarmouth	Pilot house - -	Read regularly. Chart kept.	——
Harwich - -	Coastguard station -	„ „	——
Wivenhoe - -	"Rose and Crown" -	Placed too high - -	Withdrawal recommended.

No lectures.

ABSTRACT.—CAPT. TOYNBEE.

Port Stewart - -	Post office - -	Well cared for.	——
Port Rush - -	Coastguard station -	„	——
Moville - -	„ „ -	„ - - -	Restoration to Greencastle. N.B.—Opposed by C. G. officer.
Buncrana - -	„ „ -	„	——
Rathmullen - -	Harbour constable's house.	„	——
Dunfanaghy - -	Mr. Moffitt's house -	„	——
Cushendall - -	Coastguard station -	„	——
Belfast - -	Custom house -	„ - - -	Removal to Carrickfergus.

General recommendation, that 6 p.m. forecasts be extracted from newspapers and exhibited at fishery barometer stations in Ireland.

FISHERY BAROMETERS—*continued.*

ABSTRACT.—MR. DICKSON.

Station.	Situation.	Condition.	Recommendations.
Lerwick	Pillar in centre of town.	Good, but vernier rack worn out.	Removal to harbour-master's office.
Scalloway	Pillar near post office	Good. No diagrams kept.	——
Nesting	In school house	Good.	——
Symbister	On wall near steamer store.	„	——
Uya Sound	Wall of post office	Good. No diagrams.	——
Balta Sound	At steamer agent's office.	Found locked up in store, as original receiver was dead. Transferred to steamer agent. Contained some air.	——
Sandsair	In Lieut. Bruce's garden.	Good. No diagrams kept	Removal to post office.
Kirkwall	Harbour office	Good. No diagrams.	——
Burray	Post office	Good. Diagrams not exposed.	——
Stornoway	In office, pier head	Not very good. Air in tube. No diagram.	——
Ness	Post office	Bad	New instrument wanted.
Cromore	On store wall	Good. No attention paid by fishermen.	——
Bayble		No barometer. Stolen a year ago.	
Obb (Strond)	In office of department of clerk of peace.	Good.	——
Portree	On end of ice house	„	——
Plockton	In centre of village	„	Capt. M'Kenzie wishes to give up charge to police.
Tarbert (Loch Fyne)	In pier wall	Fairly good. Case worn.	——
Carradale	On pier head house	Good.	——
Campbeltown	On weigh house	„	——
Stranraer	Coastguard watch room.	Fairly good. No attention paid by fishermen.	——
Portpatrick	Harbour wall	Good order.	——

GENERAL REMARKS.

Orkney Islands.—Barometers are much required at some of the outlying Orkney Islands, where the fishing is extensive and there is no telegraphic communication. This opinion was strongly expressed by several of Kirkwall Harbour Trustees, by Mr. Cursitor, and other leading gentlemen in Kirkwall.

Lewis.—The stations at Bayble and Cromore are now comparatively unimportant, the fishing having greatly diminished since the barometers were sent there.

Port of Ness is a very important station. The harbour is poor and not always accessible to boats. It is much to be desired that a reliable instrument be placed here. Telegraphic communication is now established with Stornoway, and it would be well if the station could receive warnings.

The following stations on the west side of Lewis have greatly increased in importance of late years, and the want of good barometers is much felt, viz., Carloway, Valtos, and Portnaguran. These places are recommended by Mr. Mackay, chamberlain of the Lewis, Mr. John Anderson, junior, magistrate, Stornoway, Mr. Alexander Mackenzie and Mr. Kenneth Smith, fish curers, Stornoway, and Mr. Morrison, harbour-master. Mr. Kenneth Smith undertakes to provide cases and to find men to take charge of instruments at these stations.

Captain Allison, Lerwick, Mr. Morrison, Stornoway, and Captain McCorkindale, Campbeltown, possess themselves a good knowledge of elementary meteorology, and do all they can to interest and instruct the fishermen. They state that copies of the Daily Weather Reports would be of great use if sent to them.

I was requested by Mr. Thomson, Custom House officer, Stromness (who takes charge of M.O. telegrams), on behalf of the fishermen, to hold a meeting in Stromness; but this could not be done without involving serious loss of time, and as Stromness is not one of the Fishery Barometer stations, I thought it better not to accede to this request.

(Signed) H. N. DICKSON.

Edinburgh, 10th November 1888.

GENERAL RECOMMENDATIONS

More barometers for Orkney.
Suppress Bayble and Cromore.
Send Cromore barometer to Ness.
Supply Carloway.
" Valtos.
" Portnaguran.
Send Daily Weather Reports to certain stations.

Submitted—The following report :—

REPORT of INSPECTION of the SCOTTISH STATIONS for 1888.

Barometers.

The inspector's mercurial Standard Barometer No. 532, which had been repaired, was taken with me on the tour of inspection. Unfortunately in driving from Kirkwall to Swanbister the horse came down, and the barometer was broken by the shock. Hence for the stations inspected after Wick, the barometers could not be compared with an inspector's mercurial standard.

The results of the inspection of these instruments, such as they are, are shown by the following table. I am able, however, to report that the barometers were all in good order and observed with the same accuracy as in former years.

—	Inspector's Standard corrected.	Not corrected.		Remarks.
		Rep. Barometer.	Check Barometer.	
Rothesay -	29·953	29·958	—	
Laudale - -	—	29·968	29·974	Check barometer is 8 feet higher in flat above, where at the time temp. was 4°·7 higher.
Lairg - -	29·316	29·313	—	
Dunrobin -	29·633	29·638	—	Temp. of rep. barometer was 1°·4 higher than standard barometer.
Wick - -	29·602	—	29·598	In house.
Do. -	30·098	30·094	→	In shop, compared the following morning.
Swanbister -	—	30·486	—	
Stornoway -	—	30·292	30·288	
Nairn - -	—	30·360	30·360	
Aberdeeen -	—	—	30·158	The observatory barometer read 30·162.
Braemar - -	—	29·167	—	
Dundee - -	—	30·280	—	
Ardrossan -	—	30·416	—	Check barometer in Saltcoats.
Leith - -	—	29·946	—	Do. in house.

Thermometers.

The thermometers at the various stations were compared in water with the Standard Thermometer No. 2395. The next table gives the " corrected readings of the standard " and the errors of each thermometer as ascertained by the comparisons made. None of the minimum thermometers were this year found to be out of order; and as regards the maximum thermometers, provision is now made, where required, against displacement of the index during high winds.

—	Standard No. 2395, corrected.	Dry Bulb.	Wet Bulb.	Spare Thermometer.	Max. Thermometer.	Min. Thermometer.	Time in Water, in Minutes.	Change of Temperature.	Remarks.
Rothesay -	56°·0	−0°·1	0°·0	—	+0°·1	−0°·4	130	Uniform.	
Laudale - -	59·1	+0·2	+0·2	—	+0·2	+0·2	150	Do.	
Lairg - -	56·2	+0·1	0·0	—	−0·1	−0·1	90	Do.	
Dunrobin -	58·1	−0·5	−0·4	—	+0·6	−0·6	130	−0·2	
Wick - -	54·5	+0·3	+0·4	—	−0·3	−0·1	75	+0·3	
Swanbister -	58·6	0·0	+0·2	—	+0·2	−0·3	120	+0·3	
Stornoway -	57·5	+0·5	+0·5	+0·3	−0·3	−0·5	120	+0·2	
Nairn - -	55·0	+0·6	+0·7	0·0	−0·1	+0·9	80	Uniform.	
Aberdeen -	57·0	+0·1	+0·1	—	+0·6	0·0	135	+0·4	
Braemar - -	59·0	+0·5	+0·4	—	0·0	−0·2	150	Uniform.	
Dundee - -	54·7	+0·5	+0·6	—	+1·4	−0·2	75	Do.	
Ardrossan -	55·0	+0·2	+0·2	—	−0·3	−0·3	105	+0·3	
Leith - -	52·0	+0·1	+0·5	—	+0·1	−0·4	50	Uniform.	
King's College, Aberdeen.	57·0	—	—	—	0·0	−0·2	—	—	

Hygrometers.

In this inspection, as in the previous one, the dry and wet bulbs were read instantly on opening the thermometer screens with the view of collecting data as to the condition in which these instruments are kept at the stations. The results, which are quite similar to those in last year's report, are not given in this report. It may, however, be noted that at Ardrossan, where the hygrometer was in fairly good order, the readings were 52°·4 and 50°·5, the difference being much smaller than might have been expected from the dry bracing air at the time. As the screen was at the time running wet with the heavy dew, the real hygrometric state of the air could not be observed by the dry and wet bulbs in the screen.

NOTES on the STATIONS.

Rothesay, August 30th, 1888.—The instruments were all in good order, and are observed with great care and intelligence.

Laudale, September 1st.—The instruments were in excellent order; and are, on the whole, well observed. The daily observations of four months schedules were gone over with Mr. Fletcher, and during the examination an error of half an inch and another of a hundredth of an inch of the barometer were pointed out and three or four errors of the hygrometric observations—all of these, except one, a reference to the observation book showed to be errors of copying. Frost, fog, and mist are now entered properly.

Owing to the heavy storm of rain and strong wind it was necessary to drive up the north side of Loch Sunart and cross by boat to Laudale. In the circumstances I did not take the barometer with me across the loch.

Fort Augustus, September 4th.—A hasty visit was made to this station during the interval it took the steamer to pass the locks at Fort Augustus, when I found everything in excellent order.

Lairg, September 5th.—The instruments were all in good order, and are very well and carefully observed. The observer makes good use of his position, as ground officer for the Duke of Sutherland, in noting some of the more prominent effects of weather on the growing crops.

Dunrobin, September 6th.—The instruments were in very good order, and the observations are carefully made. The rain-gauge was slightly deformed, as if it had been struck with a stone, but it will be easily put right.

Wick, September 6th.—The instruments were in good order, and the observations made with care and intelligence. I read the times at which, for the first four days of August, the daily telegrams were handed in to the post office at Wick, first to Mr. Sinclair at his house, and then to Miss S., the assistant, at the shop, and stated that an improvement in this matter must be made. Mr. S., it may be remarked, has been at intervals far from well.

Swanbister, September 8th.—Mr. Fortescue being from home at the time of my visit, his maid servant, aged 17, who was in charge, accompanied me round the instruments, including the anemometer, read them, and answered all questions put to her regarding their manipulation, &c. with quite remarkable intelligence. Everything was in excellent order.

Unfortunately, on the way out the horse came down, and by the sudden stoppage of the four-wheeled dog cart, the barometer carried with me was broken.

Stornoway, September 12th.—The instruments were in excellent order, and particularly well observed; Miss Riddoch, the first assistant, made the observations and prepared the telegram with correctness and despatch, and Miss Forbes, the second assistant, observed the instruments correctly, and is being taught to make up the telegram.

It appears that the clock of the barograph does not go for a whole week, but requires a few turns on Friday evening to keep it going till Monday morning. Otherwise it is in good working order, and its indications are compared every morning with the corrected readings of the station barometer.

The wind observations were gone into with care in connexion with the queries received from the Office regarding the wind observations of the previous observer.

Nairn, September 13th.—The instruments were in good order, and read by Miss Penny and the two assistants with particular care. The grass plat in the garden where the instruments are has been considerably extended. The Stevenson screen had recently been repaired by Mr. P. in a workmanlike manner and is in good order.

Aberdeen, September 17th.—The instruments were removed from Mr. M'Cormack's, the late observer, to Mr. Boswell's in the beginning of July. One of the barometers, No. 537, has been hung beside the old standard barometer of the observatory, the other one No. 538 in Mr. Boswell's house. The Stevenson screen has been placed in Mr. B.'s garden, and the rain-gauge beside the thermometers in King's College grounds.

The instruments were in excellent order, and in all respects well attended to and observed.

Braemar, September 18th.—The scale of the maximum thermometer, which has been in use for 30 years, has become very indistinct, and cracked in various directions, rendering a new one desirable. All the other instruments were in good order and well attended, and read expertly and correctly by both observers.

Dundee, September 19th.—The instruments were in very good order, and well attended to and observed. The wind observations continue to be accurately made, both as respects force and direction.

Ardrossan, September 20th.—As Mr. Mayes removes to Ardrossan in May next, better arrangements will be made for utilizing the check barometer. The rain-gauge requires extensive repairs,

the nails holding its outer casing to the wooden box having been rusted out three months previously The accompanying squeeze shows its circularity to be fairly good, but the outside part above ground wears now a battered look. Directions were given to have it thoroughly repaired, particular attention being given to secure its fixity and horizontality. The muslin of the hygrometer, which had been renewed three weeks before, had got dirty, doubtless occasioned by the extensive works in progress in the extension of the harbour of Ardrossan. In the circumstances I gave direction to change the muslin once a fortnight.

The observations were carefully and correctly made by Mr. M. and his assistant.

Leith, October 29th.—The instruments were in very good order, and attended to, observed, and reported with conscientious care.

Dunrossness.—This year the station was inspected by Mr. Dickson while in that part of Shetland inspecting the Fishery Barometers. He reported that the errors of the thermometers were in accordance with previous reports, and that the readings of all the observers were accurately made.

Aberdeen, King's College Observatory, September 17th.—Everything here was in excellent order, and the work of the observatory appeared to be well attended to.

(Signed) ALEXANDER BUCHAN.

INSPECTION of OBSERVATORIES and ANEMOGRAPHS.
1888.

THIS year I have visited the observatories at Aberdeen, Glasgow, Oxford, and Stonyhurst, and inspected the anemographs at Fleetwood, North Shields, Swanbister, and Yarmouth.

Aberdeen, visited September 4th.—The instruments were all examined and duly cleaned where necessary, as usual, the schedule of examination notes being also filled in. A Stonyhurst discharger, after it had undergone adjustment at Kew, was fitted to the Beckley rain-gauge.

The reference standard thermometers, as well as the maximum and minimum thermometers for eye observations, were tested at their freezing points by means of melting ice, and their readings found to be as follows :—

Dry standard, No. $\frac{397}{458}$	$-32^{\circ}\cdot0$
Wet „ No. 395	$-32^{\circ}\cdot6$
Max., M.O. 1002	$-32^{\circ}\cdot0$
Min. $\frac{5056}{M.O.89}$	$-32^{\circ}\cdot0$

The minimum thermometer is not in good repair, the fitting piece at one extremity of the tube being replaced by putty.

The Richard barograph having had a new pen fitted, I re-adjusted the zero to the barometric pressure as indicated by the standard.

Glasgow, September 14th.—I examined, and with the aid of White's men, cleaned all the meteorological instruments at this observatory. I found all in proper repair and in good condition, with the exception of the anemograph, the fan spindle of which is almost worn out.

The thermometers were compared with Kew Standard 682, with the following results :—

Corrections to dry-bulb standard, No. 550	$-0^{\circ}\cdot4$
„ wet „ „ „ 472	$-0^{\circ}\cdot6$
„ Standard barometer, Att. Th. K.O. 2479	$-0^{\circ}\cdot7$
„ Barograph thermometer, B.T.	$-0^{\circ}\cdot9$
„ Maximum, No. 58,846	$0^{\circ}\cdot0$
„ Minimum, No. 63,942	$-0^{\circ}\cdot2$

Stonyhurst, September 20th.—All the instruments were found to be in good order, and carefully kept. The joints of the anemograph shafting were, however, somewhat loose, but were improved by forcing the pins home harder in the Hook's joints. One Robinson cup is loose on its axis, and the spindle was found to be a good deal worn. This Mr. Carlile remedied by grinding the bearing up again.

The thermometers were compared with Kew Standard 682, with the following results :—

Corrections to dry-bulb standard, No. 619	$-0^{\circ}\cdot2$
„ wet „ „ „ 382	$-0^{\circ}\cdot5$
„ maximum, M.O. 439	$-0^{\circ}\cdot3$
„ minimum, B.T. 501	$+0^{\circ}\cdot2$

Radcliffe Observatory, Oxford, September 25th.—The instruments at this observatory were all in good order, and working properly. Mr. Wickham alluded to a difficulty he had had with the cylinder clips breaking, and mentioned the desirability of having duplicate cylinders for use under such circumstances.

I compared the thermometers with my standard, with the following results :—

Correction to Radcliffe dry-bulb standard of reference, No. 576	$-0^{\circ}\cdot3$
„ „ wet „ „ „ 575	$-0^{\circ}\cdot4$
„ Stevenson's screen, dry-bulb, No. B.T. 1710	$-0^{\circ}\cdot4$
„ „ wet „ No. 1709	$-0^{\circ}\cdot4$
„ barograph thermometer, No. 12,259	$-0^{\circ}\cdot2$

ANEMOGRAPHS.

Yarmouth.—The anemograph was inspected on August 28th and 29th. Unfortunately the weather was very stormy at the time, and it was not easy to dismount it entirely under the circumstances. I found, however, that the instrument was in good order, well oiled, and carefully kept. The cups and stays are much worn, and will require to be replaced by new ones next year; one stay had quite given way, but I repaired it with wire; the fans are quite perfect. The registering apparatus is in excellent order, the clock having been recently cleaned by a local watchmaker.

North Shields, August 30th and September 1st.—This instrument is well cared for by Captain Harrison, the light-keeper, who is assisted by a local mechanic who well lubricates it every three months. I entirely dismounted it and had every part cleaned and oiled.

The recorder having become somewhat dusty by material fallen from the old brickwork in the tower, I took that also to pieces, as well as the clock, and got all cleaned. At the same time I had some of the pivot holes in the clock re-bushed by a watchmaker so as to improve its going, which was not quite satisfactory.

Swanbister, Orkney.—This instrument was inspected September 10th. Mr. Fortescue takes great care of it, and it is kept well oiled and painted. I thoroughly dismounted and cleaned it.

Mr. F. had observed that heavy rain had during the winter entered the cup at the top of the velocity shaft, and, by displacing the oil, filled it with water, which in subsequently freezing had stopped the instrument during frost. I requested him to be particular in replacing the plug in the oil hole after oiling, in order, if possible, to prevent the recurrence of this accident.

Fleetwood.—The instrument was examined on September 21st and 22nd and found to be in good order throughout. Being in a building open to the public, I found the anemograph is looked upon with much interest by the visitors, but owing to the care of Mr. Gaulter and the keeper of the pavilion, it has not suffered any damage at their hands.

(Signed) G. M. WHIPPLE.

(M.O. 2234.)

DEAR SIR, Kew Observatory, November 17, 1888.

I BEG to hand you herewith my report to the Meteorological Council regarding the condition of their self-recording instruments at the Valencia and Falmouth observatories, as well as for the anemograph stations at Holyhead and Mountjoy Barracks, Dublin.

Holyhead, visited October 1st–2nd.—At this station the anemograph was in good working order, and is evidently well cared for. The external parts of the instrument I had dismounted, and carefully examined the same, but neither the fans nor the cup arms showed any signs of wear. After cleaning and replenishing the bearings with fresh oil, the orientation was examined, and the observer was instructed to orientate the instrument once a month and forward the result to the Meteorological Office.

Mountjoy Barracks, October 3rd.—The anemograph here was going satisfactorily, but the clock required cleaning badly. This was duly done, and the other parts of the instrument were cleaned and all the bearings oiled, with the exception of the direction brake, which had only been quite recently attended to.

The orientation was tested, and the observer instructed to perform the operation monthly and send result to the Office.

Valencia, visited October 6th–10th.—As is usual at this observatory, all the instruments were in good order.

The clocks of both the barograph and thermograph were taken to pieces and cleaned and new lines attached. The lenses, condensers, &c. received the usual cleaning, and the zero dots were shifted to the winter position. At the time of my visit the photography was very good, but owing to a considerable amount of stray light falling upon the thermograph cylinder, the sheets were discoloured; this, however, was entirely got rid of by the re-blackening of both the dry and wet tubes.

With regard to the definition of the wet-bulb trace in a certain part of the scale this cannot be improved, as has already been pointed out in previous reports.

In both instruments the action of the light stop was slightly prolonged, so that now in the case of the thermograph the light is cut off at two minutes before the even hour and comes on again at four minutes past the hour, whereas for the barograph the stop comes into action at four minutes to the even hour and ceases at two minutes past the hour.

The thermometers were compared by means of a Kew standard thermometer No. 682 at 55 degrees, and their correction found to be as follows:—

Dry, Standard 399	-0.8°
Wet, Standard 398	-0.6
Maximum, M.O. 1003	0.0
Minimum, 2497	-0.3
Standard Barometer, attached thermometer, 71,062	-0.1
Barograph thermometer (no number)	-2.1

The rain-gauge was taken to pieces and cleaned, a new line attached and a Stonyhurst discharger fitted and adjusted to same.

Anemometer.—The external parts of this instrument were entirely taken down and cleaned, and the bearings replenished with fresh oil. The orientation was then tested, and the result is appended to this report.

Falmouth, visited October 15th–19th.—Everything here was carefully tended and in good order. The anemometer was completely dismounted and all parts cleaned, the different bearings afterwards being replenished with fresh oil. The cup stays showed no signs of wear, but two blades of one of the fans were found loose; these I had re-soldered before again erecting the instrument.

The clock was taken to pieces and cleaned, and the orientation examined, the sheet being sent herewith.

As regards the barograph and thermograph, the usual cleaning of the clocks was performed and the lenses and other parts attended to. The photography was excellent, but the thermograph sheets were more or less discoloured owing to stray light; this was, however, effectually remedied by the re-blackening of one of the tubes. At the time I noticed that the dry and wet dots of light were not quite vertically one over the other on the cylinder; this was duly put right.

In the case of the barograph, a slight alteration was made in the action of the light stop.

The thermometers were compared with Kew Standard No. 682, and found to have the following corrections at 63 degrees:—

Dry, Standard 383	$-0^{\circ}\cdot75$
Wet, Standard 388	$-0\cdot45$
Maximum, M.O. 104	$-0\cdot6$
Minimum, M.O. 308	$-0\cdot2$
Barograph thermometer (no number)	$-0\cdot8$
Standard barometer, attached thermometer (no number)	$-0\cdot9$

The rain-gauge clock was taken to pieces and cleaned, and a new line attached, while at the same time a Stonyhurst discharger was fitted and adjusted to the instrument. With reference to the slight sagging of the pencil-trace towards midnight I was unable to detect the cause; it was certainly not due to faulty attachment of the paper, as this was carefully examined and by measurement found accurately adjusted to the cylinder.

(Signed) T. W. Baker

To R. H. Scott, Esq., F.R.S.

Submitted—Letter 2126 from Mr. Ley, stating that he was unable to carry out any inspections in England.

Mr. Scott was instructed to inform Mr. Ley that the Council would arrange for the inspections and the payment for them this year, and that they hope his health will permit him to undertake the duties next year. (P.C. 2378.)

It was resolved that the arrangements for the English inspection be determined at next meeting.

Read—A memorandum from the Marine Superintendent reporting that since the last meeting 7 logs had been received, all of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. J. G. Cameron	S.S. "Adriatic"	June 14—Oct. 25, 1888.	New York and home (5 voyages).	1888, p. 24.
Staff. Comr. E. S. Clapp, R.N. / H. K. Sturdee	"Richmond"	May 2—Sept. 2, 1888.	Cruizing among Bahamas	1888, p. 44.
W. D. James, Esq.	"Lancashire Witch."	July 28—Sept. 30, 1888.	Spitzbergen, Kara Sea, and Norwegian Ports.	—
Capt. Rd. Jones	"Thos. Hilyard"	Mar. 13—Sept. 16, 1888.	Rio Janeiro, Quebec, and homeward to 50° W. long.	1887, p. 123.
Capt. W. F. Milne	S.S. "Esquimaux."	May 22—Oct. 30, 1888.	St. John, Newfoundland, Davis Straits, and home.	1887, p. 85.
Capt. Alex. Murray	Barque "Perseverance."	July 20, 1887—Sept. 21, 1888.	Cumberland Sound and home.	1886, p. 65.
Capt. N. J. Wheaton	Barque "Eliza"	April 26—Oct. 24, 1888.	Barbados, Minatitlan, and home.	1887, p. 139.

Mr. Scott was instructed to present the Meteorological Atlas of the British Isles to Mr. James and to convey the best thanks of the Council to the other observers.

Submitted—The following report on the forecasts for October 1888:—

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

OCTOBER.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	52	70	61	86
,,	b	30	19	25	
,,	c	15	0	7	
,,	d	3	11	7	
Scotland, E.	a	48	59	54	87
,,	b	30	37	33	
,,	c	19	0	10	
,,	d	3	4	3	
England, N.E.	a	48	52	50	85
,,	b	37	33	35	
,,	c	0	4	2	
,,	d	15	11	13	
England, E.	a	37	41	39	86
,,	b	52	41	47	
,,	c	7	7	7	
,,	d	4	11	7	
Midland Cos.	a	48	37	43	80
,,	b	41	33	37	
,,	c	11	19	15	
,,	d	0	11	5	
England, S.	a	52	52	52	87
,,	b	37	33	35	
,,	c	7	8	8	
,,	d	4	7	5	
Scotland, W.	a	44	48	46	83
,,	b	41	33	37	
,,	c	11	0	6	
,,	d	4	19	11	
England, N.W.	a	59	56	58	83
,,	b	33	18	25	
,,	c	4	15	10	
,,	d	4	11	7	
England, S.W.	a	63	54	59	89
,,	b	30	31	30	
,,	c	0	11	6	
,,	d	7	4	5	
Ireland, N.	a	52	61	57	93
,,	b	37	35	36	
,,	c	7	0	3	
,,	d	4	4	4	
Ireland, S.	a	52	73	63	89
,,	b	30	23	26	
,,	c	11	0	6	
,,	d	7	4	5	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	52	74	63	86
,,	b	29	16	23	
,,	c	16	7	11	
,,	d	3	3	3	
Scotland, E.	a	49	55	52	87
,,	b	35	35	35	
,,	c	10	10	10	
,,	d	6	0	3	
England, N.E.	a	55	58	57	81
,,	b	26	23	24	
,,	c	6	6	6	
,,	d	13	13	13	
England, E.	a	55	52	54	86
,,	b	36	29	32	
,,	c	6	13	10	
,,	d	3	6	4	
Midland Cos.	a	58	42	50	82
,,	b	32	32	32	
,,	c	7	23	15	
,,	d	3	3	3	
England, S.	a	55	52	54	84
,,	b	32	29	30	
,,	c	3	19	11	
,,	d	10	0	5	
Scotland, W.	a	45	39	42	86
,,	b	45	42	44	
,,	c	10	0	5	
,,	d	0	19	9	
England, N.W.	a	71	52	62	84
,,	b	16	29	22	
,,	c	7	13	10	
,,	d	6	6	6	
England, S.W.	a	61	55	58	91
,,	b	29	36	33	
,,	c	3	3	3	
,,	d	7	6	6	
Ireland, N.	a	58	65	62	83
,,	b	16	26	21	
,,	c	23	9	16	
,,	d	3	0	1	
Ireland, S.	a	42	71	57	78
,,	b	19	23	21	
,,	c	29	3	16	
,,	d	10	3	6	

SUMMARY.

British Isles	a	51	55	53	86
,,	b	36	30	33	
,,	c	8	6	7	
,,	d	5	9	7	

British Isles	a	55	56	56	84
,,	b	28	29	28	
,,	c	11	10	11	
,,	d	6	5	5	

Submitted the following correspondence (Minutes, p. 43) :—

(M.O. 2135.)

SIR, Lloyd's, E.C., November 3, 1888.

I BEG to acknowledge the receipt of your letter of the 2nd November, and to thank you for the information contained therein. If it were of a great advantage to the foretelling of weather, my Committee would be willing to consider having observations taken at signal stations which they may in future erect, on behalf of the Meteorological Office, without charge to the Office, and they might endeavour to arrange for a daily telegram, or two daily telegrams, being sent from each station without cost to the Office, provided that the Postmaster-General would be willing to grant some favourable terms for the transmission of such telegrams.

I am, &c.
(Signed) H. M. HOZIER,
Secretary.

The Secretary, Meteorological Office,
116, Victoria Street, S.W.

P.C. 2250.
(M.O. 2135.)

SIR, Meteorological Office, November 5, 1888.

I BEG to acknowledge receipt of your letter of the 3rd instant (No. 20,265), and to thank you for the very liberal offer contained therein.

I will bring the matter to the notice of the Meteorological Council at their next meeting, but in the meantime I may say that it is not at all likely that the Postmaster-General would be willing to grant any exceptional terms for meteorological reports.

I am, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

The Secretary, Lloyd's, E.C.

(M.O. 2262.)

SIR, Lloyd's, E.C., November, 20, 1888.

WITH reference to your letter of the 5th November, M.O. 2135, I should be grateful to you if you would be so good as to let me know what is the smallest number of telegrams which the Meteorological Office would require to be transmitted from a signal station in the course of the 24 hours, as it is possible that, if the cost of these telegrams would not be very heavy, my Committee might arrange for observations being taken and the results telegraphed to your Office.

I am, &c.
(Signed) H. M. HOZIER,
Secretary.

The Secretary, Meteorological Office,
116, Victoria Street, S.W.

Mr. Scott was instructed to make further inquiries from Captain Hozier.

Submitted the following :—

LIST of STORM WARNINGS issued to the COASTS of the BRITISH ISLANDS since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result—as to the Character of the Warning.

1. WARNINGS ISSUED.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result.* Character of Warning.
1888.				
Nov. 1st, 0.30 p.m. -	Scotland, E. -	North cone	Fresh to strong gale from E. and N.E. on 2nd.	A
„ 7.40 p.m. -	Ireland, E. - -	„	Moderate N.E. gale, on 2nd. -	B
„ „ -	England, N.W. -	„	„ „ „ -	B
„ „ -	„ W. -	„	Moderate Nly. „ -	B
„ „ -	„ S.W. -	„	Fresh N.Wly. gale, night of 2nd -	A
„ „ -	„ E. (northern part).	„	Moderate to fresh N.Ely. gales, on 2nd.	A

* A = complete success (*i.e.* justified by gales of force 8 or more by Beaufort's scale).
B = partial „ („ „ winds „ 6 or 7 „).
C = failure „ („ not justified by either gales or strong winds).

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result. — Character of Warning.
1888.				
Nov. 2nd, 3.30 p.m. -	Scotland, W.† -	North cone	Neither gales nor strong winds -	C
„ 7 p.m. -	Ireland, S. - -	„	„ „ „ -	C
„ „ -	England, S.E. (excepting mouth of Thames).	„	Moderate Ely. gale, morning of 3rd	B
„ „ -	„ E. (southern part).	„	„ „ „ -	B
Nov. 4th, 9.50 a.m. -	Ireland, S. - -	South cone	Neither gales nor strong winds -	C
„ „ -	„ E. - -	„	Strong Ely. winds, morning of 5th -	B
„ „ -	England, N.W. (Bangor only).	„	Neither gales nor strong winds -	C
„ „ -	„ W. -	„	Strong S.Ely. wind, night of 4th -	B
„ „ -	„ S.W. -	„	„ S.Wly. „ „ -	B
„ 7.10 p.m. -	Scotland, E. -	„	Strong Sly. gale, night of 4th -	A
„ „ -	„ W. -	„	Neither gales nor strong winds -	C
„ „ -	England, N.W. (except Bangor).	„	„ „ „ -	C
„ „ -	„ S. -	„	„ „ „ -	C
„ „ -	„ S.E. -	„	Fresh Ely. gale, morning of 6th -	A
„ „ -	„ E. -	„	„ „ „ -	A
Nov. 7th, 10 a.m. -	Scotland, E. -	South cone	Moderate Ely. gale, early morning - 9th.	B
„ „ -	„ W. -	„	Moderate S.Ely. gale, on 8th -	B
„ „ -	Ireland, S. - -	North cone	Fresh Ely. gales, evening of 8th -	A
„ „ -	„ E. - -	„	Moderate S.Ely. gale, on 8th -	B
„ „ -	England, N.W. -	„	Fresh Ely. gale, evening of 8th -	A
„ „ -	„ W. -	„	Fresh S.Ely. gale, night of 8th -	A
„ „ -	„ S.W. -	„	„ „ on 8th -	A
„ „ -	„ S. - -	„	No increase of wind after issue of warning.	C
„ „ -	„ S.E. -	„	„ „ „ -	C
„ „ -	„ E. -	„	„ „ „ -	C
Nov. 9th, 3.20 p.m. -	Ireland, S. - -	South cone	Fresh S.Ely. gale, night of 9th -	A
„ „ -	„ E. - -	„	Moderate S.Ely. gale, on 10th -	B
„ „ -	Scotland, E. -	„	Strong S.Ely. and Sly. gales, on 10th.	A
„ „ -	„ W. -	„	Moderate S.Ely. gale, on 10th -	B
„ „ -	England, N.W. -	„	Strong S.Ely. wind, evening of 10th	B
„ „ -	„ W. -	„	Strong S.Ely. winds, on 10th -	B
„ „ -	„ S.W. -	„	Fresh S.Ely., gale, on 10th -	A
„ „ -	„ E. (northern part).	„	„ „ night of 9th -	A
Nov. 11th, 7 p.m. -	Ireland, S. - -	South cone	Fresh S.Ely. gale, night of 11th -	A
„ „ -	„ E. - -	„	Moderate S.Ely. gales, on 12th -	B
„ „ -	Scotland, E. - -	„	Strong S.Ely. gales, on 13th -	A
„ „ -	„ W. -	„	Moderate S.Ely. gales, on 13th -	B
„ „ -	England, N.W. -	„	Neither gales nor strong winds -	C
„ „ -	„ W. -	„	Moderate S.Ely. gales, morning of 12th.	B
„ „ -	England, S.W. -	„	Strong S.Ely. winds, morning of 12th.	B
„ „ -	„ E.(northern part).	„	Fresh S.Ely. gale, on 13th - -	A
Nov. 12th, 3 p.m. -	England, S. -	South cone	Strong Sly. gale, on 12th - -	A
„ „ -	„ S.E. -	„	Strong S.Ely. and Sly. winds, on 13th.	B
„ „ -	„ E.(southern part).	„	„ „ -	B
Nov. 14th, 7.30 p.m. -	Ireland, S. -	South cone	Moderate Wly. gale, night of 14th, and violent Sly. gale, night of 15th.	A
„ „ -	„ E. -	„	Fresh to strong S.Wly. gale, morning of 16th.	A

† Information at present available from these coasts insufficient to give very reliable results.

Day and Hour of Issue.	Coasts warned.	Signals hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result. — Character of Warning.
Nov. 14th, 7.30 p.m. -	Scotland, E. -	South cone	Severe S.Wly. to Wly. gale on 16th	A
" " -	" W. -	"	" " -	A
" " -	England, N.W. -	"	Fresh Sly. gale, on 15th, and strong S.Wly. gale 16th.	A
" " -	" W. -	"	Fresh S.Wly. gale, on 16th -	A
" " -	" S.W. -	"	Strong S.Wly. winds, on 16th -	B
Nov. 15th, 7.20 p.m. -	England, S. - -	South cone	Fresh Wly. gale, on 17th - -	A
" " -	" S.E. -	"	Moderate S.Wly. gale, on 16th -	B
" " -	" E. -	"	Fresh S.Wly. to Wly. gale, on 16th	A
Nov. 16th, 7.40 p.m. -	Ireland, S. - -	South cone	Moderate S.Wly. gale, night of 16th	B
" " -	" E. - -	"	Moderate to fresh S.Wly. gale, morning of 17th.	A
" " -	Scotland, E. - -	"	Strong Wly. gale, night of 16th -	A
" " -	" W. -	"	Strong Wly. winds, morning of 17th	B
" " -	England, N.W. -	"	Fresh S.Wly. gale, morning of 17th	A
" " -	" W. -	"	Moderate to fresh S.Wly. gale, morning of 17th.	A
" " -	" S.W. -	"	Moderate Wly. gale, evening of 17th	B
Nov. 18th, 9.40 a.m. -	England, S. - -	South cone	Wind did not increase after issue of warning.	C
" " -	" S.E. (mouth of Thames).	"	" " "	C
Nov. 19th, 10 a.m. -	Ireland, S. (Galway only).	North cone	Severe Wly. to N.Wly. gales, on 20th.	A
" " -	" E. (northern part).	"	Fresh to strong gale from W. and N.W. on 20th.	A
" " -	Scotland, E. - -	"	Fresh Wly. to N.Wly. gales, on night of 19th and on 20th.	A
" " -	" W. -	"	Strong W. gale, on 20th - -	A
" " -	England, N.W. (northern part).	"	" " " -	A
" 3.30 p.m. -	" N.W. (southern part).	"	Severe W. to N.W. gale, on 20th .	A
" " -	" W. (Aberystwith and Milford).	"	Fresh Wly. gale on 20th -	A
" " -	" E. - -	"	Moderate to strong Wly. gale, on 20th.	A
" 7.15 p.m. -	Ireland, S. (except Galway).	South cone	Moderate to fresh Wly. gale, on 20th.	A
" " -	" E. (southern part).	"	" " -	A
" " -	England, W. (except Aberystwith and Milford).	"	" " -	A
" " -	" S.W. -	"	" " -	A
" " -	" S. -	"	" " -	A
" " -	" S.E. -	"	Moderate Wly. gale on 20th -	B

SUMMARY.

A + B - - - - - -	70
C - - - - - - -	13

2. GALES EXPERIENCED WITHOUT WARNINGS.—None.

Telegraphic Branch,
21st November 1888.

(Signed) FREDC. GASTER.

Submitted—The following memorandum :—

MEMORANDUM.

Meteorological Office, November 20, 1888.

METEOROLOGICAL OBSERVATIONS taken at various COLONIAL and FOREIGN STATIONS by the ROYAL ENGINEERS and by the OFFICERS of the ARMY MEDICAL DEPARTMENT during the Years 1852–1886.

I BEG to report that the further revision of these observations (see Minutes, 1887–8, page 134) has now been completed, and that it has resulted in the detection of a large number of errors in the various sheets, some of which were errors of observation and some errors of reduction. The errors thus discovered have been as far as possible corrected, but in some cases where the errors were very numerous, or where any correction of the observations would have been attended with much uncertainty, I have rejected the readings, deeming this the preferable course to either printing a value I believed to be wrong, or publishing, as based upon observation, figures which in reality were obtained in the Office.

Sometimes the figures were not what might have been expected, and yet after careful examination I have been unable to detect any manifest error. I have usually in such cases allowed the figures to stand, inserting a note calling attention to the doubt regarding them. I have also usually allowed the figures to stand in those cases where, although the results were dubious, they were corroborated by the results in other months.

The returns from the various stations for the years 1885 and 1886 (see Minutes, 1887–8, page 134) have been received from the Army Medical Department, and the work of preparing the observations for those years for the printer is now in hand.

For the purposes of the revision, now completed, I have had to prepare tables of the monthly barometric and thermometric means and differences in the form shown in the paper attached to this memorandum. Would the Council desire these tables, or the tables of means only, to be printed?

For some few stations it is possible to obtain the mean values for periods of 5, 10, or 15 years. Would the Council desire me to work out such means where I can?

I presume these observations will be printed in 4to, in the same style as Part II. of "Observations at Stations of the Second Order," and that the printing may now be proceeded with as soon as possible. If so printed the work will occupy about 340 pages, or rather more if the tables of means referred to above are included.

(Signed) JOHN A. CURTIS.

R. H. Scott, Esq., F.R.S.

MAURITIUS.

BAROMETRIC and THERMOMETRIC MEANS and DIFFERENCES.

MAURITIUS PRESSURES.

Means of Observations at 9.30 a.m. and 3.30 p.m.

—	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.
January	—	29·896	·914	·841	·980	·863	·882	·966	·811	·875
February	—	29·847	·802	·904	·815	·845	·934	·951	·809	·709*
March	—	29·901	·924	·873	·925	·929	·953	·944	·822	·917
April	—	29·952	·964	·943	·957	·962	·004	·003	·987	·998
May	—	30·029	·016	·035	·990	·065	·034	·045	·011	·016
June	—	30·076	·108	·108	·117	·067	·087	·147	·131	·093
July	—	30·157	·108	·195	·110	·171	·116	·179	·167	·150
August	—	30·114	·153	·169	·166	·178	·127	·172	·132	·157
September	—	30·109	·101	·148	·130	·147	·163	·147	·105	·155
October	—	30·113	·059	·104	·105	·057	·102	·099	·065	·076
November	—	29·962	·002	·033	·985	·022	·049	·015	·048	·988
December	29·956	29·947	·949	·960	·925	·953	·978	·949	·956	·906
Year	—	30·009	30·009	30·026	30·017	30·022	30·036	30·051	30·004	30·003

* February 1861. Hurricane, with low barometer during this month.

Differences. 9.30 a.m.—3.30 p.m.

—	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.
January	—	−·057	−·060	−·054	−·062	−·060	−·060	−·067	−·059	−·060
February	—	·067	·056	·052	·051	·060	·058	·060	·056	·070
March	—	·062	·062	·064	·062	·056	·060	·061	·071	·059
April	—	·071	·063	·064	·065	·062	·066	·066	·071	·073
May	—	·066	·069	·072	·068	·061	·072	·073	·073	·078
June	—	·065	·072	·066	·070	·064	·069	·074	·070	·074
July	—	·074	·066	·068	·067	·071	·068	·067	·076	·076
August	—	·077	·078	·073	·075	·073	·080	·077	·080	·082
September	—	·079	·075	·077	·069	·069	·075	·079	·082	·089
October	—	·072	·067	·074	·067	·069	·073	·071	·075	·081
November	—	·055	·056	·060	·055	·062	·066	·069	·073	·065
December	−·062	·055	·055	·059	·054	·053	·061	·049	·062	·062
Year	—	·067	·065	·066	·064	·063	·067	·068	·071	·072

MAURITIUS.—TEMPERATURES.

M. = Mean of maximum and minimum.
a. = Difference from M. of mean at 9.30 a.m.
p. = „ „ „ 3.30 p.m.
NOTE.—Entries in italic indicate that M. is lower.

—	January.			February.			March.			April.			May.			June.		
	M.	a.	p.	M.	a.	p.	M.	a.	p.	M.	a.	p.	M.	a.	p.	M.	a.	p.
1852	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1853	80·8	*·8*	*2·2*	82·3	*1·0*	*2·4*	80·9	*·9*	*2·2*	79·1	*·8*	*1·5*	76·6	*·4*	*1·5*	74·0	*·2*	*1·4*
1854	82·7	*1·3*	*2·6*	81·7	*1·2*	*1·6*	80·6	*1·7*	*2·7*	79·4	*1·4*	*2·6*	76·9	*1·8*	*2·7*	73·9	*1·0*	*2·4*
1855	82·7	*1·3*	*2·3*	81·4	*1·4*	*2·2*	81·2	*1·5*	*2·3*	79·4	*1·2*	*2·4*	75·3	*1·4*	*2·4*	72·2	*1·4*	*2·3*
1856	82·6	*1·1*	*2·7*	82·1	*·3*	*1·2*	81·3	*·7*	*1·9*	80·4	*1·1*	*1·8*	76·2	*·6*	*1·6*	73·0	*·9*	*2·1*
1857	80·3	*1·3*	*2·2*	80·3	*·9*	*2·0*	80·3	*·1*	*1·2*	80·1	·2	*1·4*	75·8	·1	*·6*	74·3	·3	*·5*
1858	80·6	·1	·9	81·1	·4	*·8*	80·3	·2	*1·4*	79·3	·1	*1·4*	76·5	·5	*·6*	73·0	·4	*1·5*
1859	81·1	·6	*1·4*	82·2	*·0*	*·9*	81·1	·3	*1·1*	80·1	·7	*·5*	76·3	*·1*	*1·1*	73·7	·5	*·8*
1860	81·7	*·3*	*1·3*	82·2	·8	*·3*	81·2	·7	*1·0*	80·1	·1	*·9*	78·0	·6	*·6*	74·4	·9	·7
1861	83·9†	1†	*·8*†	81·6	1·6	·0	81·2	1·1	·7	80·6	·8	*1·0*	78·2	·9	*·5*	74·6	1·1	*·0*

† January 1861. In the early part of this month the maximum temperatures appear to be too high, and in consequence the readings to the 12th inclusive have been rejected. The values given above are based on the observations for the last 19 days of the month.

It was resolved—That it would be sufficient to print the original monthly tables. The tables of means and differences are not necessary.

116, *Victoria Street, November* 28, 1888.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN. | MR. STONE.
MR. GALTON. | THE HYDROGRAPHER.

The Secretary was in attendance.

Mr. Scott reported that he had had an interview with Captain Hozier at Lloyd's (Minutes, November 21), and had found that almost all of the signal stations were already near existing reporting stations of the Office. He had, however, found that the North Foreland was a point whence observations might be useful for the Office.

Mr. Scott was instructed to ask for reports from the North Foreland, undertaking, on the part of the Council, to supply the requisite instrumental outfit. (P.C. 2479.)

Read—Letters 2287 and 2304 from Mr. Cullum, stating that he found the electric anemometer to be now working satisfactorily (Minutes, November 21), and suggesting that it should be handed over to him to be tested thoroughly.

Mr. Scott was instructed to write to Mr. Cullum (P.C. 2452), directing him to consider the instrument as in his charge; to send up the past records, and to send the future records regularly weekly, taking special care to notice discrepancies of record as compared with that of the ordinary anemometer.

The subject of the allowances for the English inspections (in consequence of Mr. Ley's illness) (Minutes, p. 67), and the inspections of Fishery Barometers was considered.

It was resolved to allow 1*l.* per day for each day occupied in inspection, in addition to the 1*l.* allowed for expenses, and the actual travelling expenses, to Captain Toynbee and Mr. Abercromby.

Read—Letter 2289 from Mr. Dines (Minutes, p. 43), applying for a grant of 25*l.* for his anemometer experiments.

It was resolved that the request be granted, the amount of 25*l.* to cover all past expenditure on behalf of the Office. (P.C. 2416.)

Submitted—The following memoranda :—

MATERIALS for preparing ESTIMATES for 1889–90.

	Data for framing Estimates.	Estimated Expenditure for 1889–90.	Proposed for for 1889–90.	Proposed for 1888–89.
Administration :	£	£	£	£
(1.) Council	- -	1,000	1,000	1,000
(2.) Secretary	- -	800	800	800
(3.) Salaries :*	- -	800	810	810
Amounts authorised for 1889–90 :—				
Chief Clerk	333			
1 Junior Clerk	200			
2 unclassified clerks	104			
Office Keeper	109			
Messenger	55			
	801			
(4.) Rent, fuel, and lighting	- -	720	720	720
Payments for one year ending 31st Mch. 1888 :—				
Rent	635			
Fuel	54			
Gas	27			
	716			
(5.) Incidental and contingent expenses	- -	450	500	500
Payments for one year ending 31st Mch. 1888 :—				
Office Keeper's contingent account, including porter's allowance for cleaning, &c.	190			
Postage	73			
Furniture and Office repairs	98			
Carriage of parcels, &c.	18			
Stationery Office : Annual Reports and sale of forms	35			
Copying synchronous observations	11			
Books	17			
Sundries	30			
	472			
Deduct repayments under this head, including "Commission"	23			
	449			
(6.) Pensions	- -	187	190	40
(1.) Capt. H. Toynbee	144			
(2.) Mr. J. S. Harding, senr.	43			
Special Researches and Experiments	- -	1,000	1,000	1,000
*Salaries :—				
Amounts authorised for 1889–90 :—				
Harmonic analysis (Mr. Sheerman)	140			
Female staff	229			
Other payments for one year ending 31st March 1888 :—				
Instruments, &c.	11			
Bridled anemometer (Holyhead)	11			
Cloud experiments	68			
Sunshine cards	45			
Electrical anemometer	95			
Experiments with Atlantic charts	11			
Discussing R.E. and other observations	91			
Payment to Mr. Shaw	50			
,, to Mr. Strachan	63			
	814			
Deduct repayments under this head	14			
	800			
The amount under this head is, as usual, put at 1,000*l.*, without regard to expenditure.				
Carried forward	- -	4,957	5,020	4,870

* Increments specified in Minutes of 1884–5, allowed for.

	Data for framing Estimates.	Estimated Expenditure for 1889–90.	Proposed for 1889–90.	Proposed for 1888–89.
	£	£	£	£
Brought forward - - -	- -	4,957	5,020	4,870
Land Meteorology:				
(1.) Observatories and stations - - - -	- -	1,970	2,070	1,800
(Allowances and other payments for one year ending 31st March 1888):—				
Aberdeen - - - - - -	276			
Armagh - - - - - -	50			
Falmouth - - - - - -	250			
Glasgow - - - - -	74			
Kew - - - - - -	403			
Stonyhurst - - - - -	57			
Valencia (including rent) - - - -	478			
Anemograph stations - - - -	91			
Observations supplied by Meteorological Societies -	125			
Instruments - - - - -	66			
Sundries - - - - - -	4			
	1,874			
Add—for transfer of allowance to Ben Nevis from head of "Telegraphy" - - - - -	100			
	1,974			
The charge for instruments will perhaps be small.				
N.B.—By Minutes of 11 April, an offer of **£250** was made in the event of the establishment of the proposed observatory at Fort William. This amount is not included in the above figures.				
(2.) *Salaries:—Discussion and reduction of observations -	- -	1,350	1,350	1,320
Amounts authorised for 1889–90:—				
2 Senior Clerks - - - -	505			
6 Junior Clerks - - - -	760			
1 Unclassified Clerk - - - -	52			
	1,317			
(1 vacancy for an unclassified clerk.)				
Probably two will be employed.				
This list includes the late Pantagraph Branch, now engaged on the Quarterly Weather Report, Hourly Readings, &c., and the Computation and Examination Branches.				
Weather Information and Forecasts - - - -	- -	2,110	2,200	2,280
(1.) Telegraphic reports and storm warnings:				
Payments for one year ending 31st March 1888:—				
Reports from inland stations - - -	540			
Reports from abroad - - - -	142			
Reports sent abroad - - - -	468			
Storm warnings - - - -	196			
Hay harvest forecasts - - - -	27			
Private wires - - - - -	74			
Payments to reporters, &c. - - -	680			
Reports to Jersey - - - -	30			
Sundry telegrams, forecasts, &c. - -	11			
Postage of charts and incidental expenses -	243			
Instruments, screens, &c. - - -	40			
Synoptic charts (Foreign) - - -	38			
Wrappers, printing, &c. - - -	29			
Ben Nevis Observatory - - -	100			
U.S. reports - - - - -	86			
Sundries - - - - -	14			
	2,718			
Repayments during the same period - - -	611			
	2,107			
In the above items there are only 11 Post Office monthly accounts. Add (say) 100*l.* And deduct 100*l.* for transfer of allowance to Ben Nevis to "Land Meteorology" the total remaining as above.				
Carried forward - - -	- -	10,387	10,640	10,270

* Increments specified in Minutes of 1884–5, allowed for.

	Data for framing Estimates.	Estimated Expenditure for 1889–90.	Proposed for 1889–90.	Proposed for 1888–89.
	£	£	£	£
Brought forward - - -	- -	10,387	10,640	10,270
(2.) *Salaries:—Preparation and issue of reports and forecasts - - - - - - -	- -	1,700	1,700	1,670
Amounts authorised for 1889–90:—				
1 Senior Clerk (9 hours daily) - - -	309			
6 Junior Clerks (5 work 9 hours daily) - -	1,023			
2 Unclassified Clerks - - - -	97			
1 Messenger - - - - -	65			
Addition for late evening and Sunday attendance. The payments for this, for one year ending 30th Sept. 1888, were - - - -	204			
There will probably be an increase in the pay of one unclassified clerk.	1,698			
Inspections - - - - - - - -	- -	550	550	550
Payments for one year ending 31st March 1888:—				
Salaries of Messrs. Buchan and Ley - - -	300			
Travelling Charges:—				
Mr. Baker - - - - - -	17			
Mr. Buchan - - - - - -	60			
Mr. Ley (accounts not rendered at end of year) -	30			
Mr. Scott - - - - - -	58			
Mr. Whipple - - - - - -	26			
Contribution to Royal Meteorological Society - -	25			
Sundry small amounts - - - - -	8			
N.B.—The charges for inspection of Fishery Barometers will fall chiefly in the year 1888–9?	524			
Ocean Meteorology:				
(1.)* Salaries:—Discussion and reduction of observations				
Amounts authorised for 1889–90:— - -	- -	1,586	1,590	1,890
Marine Superintendent - - - -	350			
1 Senior Clerk (in charge of instruments) -	333			
1 „ „ („ Marine Rooms) -	275			
5 Junior Clerks - - - - -	745			
2 Unclassified Clerks - - - -	80			
Deduct proportion nominally chargeable to care and issue of instruments (say) - - -	1,783 200			
There will probably be an increase in the pay of one unclassified clerk.	1,583			
(2.) Salaries:—Proportion chargeable to care and issue of instruments - - - - -	- -	200	200	200
(3.) Supply of instruments to the Royal Navy - -	- -	(*a*) 354	300	350
Payments for one year ending 31st March 1888:—				
Instruments, repairs, &c. - - -	248			
Verifications - - - - -	30			
	278			
(4.) Supply of instruments, &c. to Mercantile Marine -	- -	(*a*) 348	300	350
Payments for one year ending 31st March 1888:—				
Instruments, repairs, and verifications -	73			
Agents fees, &c. - - - -	156			
Packing cases - - - -	11			
Presentation labels - - - -	7			
Sundries - - - - -	11			
[Receipts during the same period 20*l.*]	258			
(*a*) There is not much regularity about charges for instruments. The estimated expenditure under the preceding heads is taken as the mean of two years ending 31st March 1888.				
(5.) Distant island or coast stations - - -	80	20	20	20
There are no regular payments under this head. The charges in the first column were for the establishment of stations at Heligoland and West Coast Africa, and final expenses at Bermuda.				
Totals - - - - £	- -	15,145	15,300	15,300

* Increments specified in Minutes of 1884–5, allowed for.

The actual expense, estimated as closely as possible from the previous year and making allowance for possible changes, except the proposed allowance to Fort William Observatory (if established) is about 15,150*l.* This sum for special researches is left at the full amount of 1,000*l.* and the margin of 150*l.* has been included chiefly under Incidental Expenses and Telegraphy.

SYNOPSIS of OFFICE SALARIES AND PENSIONS

Service.	1889-90.	1888-89.	1889-90. Increase.	1889-90. Decrease.
	£	£	£	£
Administration	1,601	1,606	—	5
Special Researches	369	330	39	—
Land Meteorolcgy (1 vacancy)	1,317	1,314	3	—
Weather Information	1,698	1,659	39	—
Ocean Meteorology	1,783	2,091	—	308
Pensions	187	43	144	—
Totals £	6,955	7,043	225	313

In the above statement the payment of 1,000*l.* to the Council is not included.
The amounts stated are the actual salaries authorised for the respective years, so far as at present known, with the addition of an approximate amount for late evening and Sunday attendance.

METEOROLOGICAL OFFICE. ESTIMATES for the Year 1889-90.

Heads of Service.	Proposed for 1889-90.		Proposed for 1888-89.		1889-90. Increase.	1889-90. Decrease.
	£	£	£	£	£	£
Administration:						
Payment of Council	1,000	- -	1,000			
Secretary	800	- -	800			
Salaries and wages	810	- -	810			
Rent, fuel, and lighting	720	- -	720			
Incidental and contingent expenses	500	- -	500			
Pensions	190	- -	40			
		4,020		3,870	150	—
Special Researches and Experiments	- -	1,000	- -	1,000		
Land Meteorology:						
Observatories and stations	2,070	- -	1,800			
Discussion and reduction of observations	1,350	- -	1,320			
		3,420		3,120	300	—
Weather Information and Forecasts:						
Telegraphic reports and storm warnings	2,200	- -	2,280			
Preparation and issue of reports and forecasts	1,700	- -	1,670			
		3,900		3,950	—	50
Inspections:						
Salaries and travelling expenses	- -	550	- -	550	—	—
Ocean Meteorology:						
Discussion and reduction of observations	1,590	- -	1,890			
Expenses incidental to the supply of instruments:						
Care and issue of instruments	200	- -	200			
Royal Navy	300	- -	350			
Mercantile Marine	300	- -	350			
Distant island (and coast) stations	20	- -	20			
		2,410		2,810	- -	400
Totals £	- -	15,300	- -	15,300	450	450

[R. S.]

The estimates were approved, and the Secretary was instructed to forward a copy to the Treasury (P.C. 2568).

Submitted the following:—

LIST of STORM WARNINGS issued to the COASTS of the BRITISH ISLANDS since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result, as to the Character of the Warning.

1. WARNINGS ISSUED.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and Approximate Time of occurrence.	Result.* Character of Warning.
1888.				
Nov. 21st, 7.15 p.m. -	Ireland, S. -	South cone	Moderate Wly. and S.Wly. gales, on 22nd and 23rd.	B
„ „ -	„ E. -	„	„ „ „ -	B
„ „ -	Scotland, E. -	„	Strong S.Wly. winds on 22nd and 23rd, with gale in Shetlands.	A
„ „ -	„ W. -	„	Moderate Wly. gales, on 22nd and 23rd.	B
„ „ -	England, N.W. -	„	Moderate S.Wly. and Wly. gales, on 22nd and 23rd.	B
„ „ -	„ W. -	„	„ „ „ -	B
Nov. 22nd, 10.20 a.m.	„ E. (northern part).	„	Strong Wly. gales, on afternoon of 22nd.	A
„ 3.25 p.m. -	England, S.W. -	South cone	Winds did not increase after issue of warnings.	C
„ „ -	„ S. - -	„	Moderate Wly. gales, night of 22nd	B
„ „ -	„ S.E. -	„	„ „ „ -	B
„ „ -	„ E. (southern part).	„	Strong S.Wly. and Wly. winds, night of 22nd.	B
Nov. 25th, 9.20 a.m. -	Ireland, S. - -	South cone	No further increase of wind after issue of warnings.	C‡
„ „ -	„ E. - -	„	„ „ „ -	C‡
„ „ -	Scotland, E. -	„	Moderate to strong S.Wly. gales, night of 25th.	A
„ „ -	„ W. -	„	No further increase of wind after issue of warnings.	C
„ „ -	England, N.W. -	„	Moderate S.Wly. gales, on 25th -	B
„ „ -	„ W. -	„	No further increase of wind after issue of warnings.	C
„ „ -	„ S.W. -	„	Fresh S.Wly. gale, evening of 25th.	A
„ „ -	„ S. - -	„	Strong S.Wly. gale, night of 25th -	A
„ „ -	„ S.E. -	„	Fresh S.Wly. gale, night of 25th -	A
„ „ -	„ E. - -	„	Moderate S.Wly. gale, on 25th -	B
Nov. 27th, 11.30 a.m.	Ireland, E. -	North cone	Moderate to fresh Ely. gale, early on 29th.	A
„ „ -	Scotland, E. - -	„	Strong Ely. gale, evening of 27th -	A
„ „ -	„ W. -	„	Neither gales nor strong winds -	C
„ „ -	England, N.W. -	„	Strong Wly. gale, evening of 27th -	A
„ „ -	„ E. - -	South cone	Fresh S.Wly. gale, evening of 27th.	A

* A = complete success (*i.e.* justified by gales of force 8 or more by Beaufort's scale).
B = partial „ („ strong winds, force 6 or 7 „).
C = failure (*i.e.* not justified by either gales or strong winds).
‡ These warnings to Ireland would not have been issued if the 8 a.m. report from Valencia had arrived promptly.

SUMMARY.

A + B - - - - = 20
C - - - - = 6

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNING WAS ISSUED.

None.

FREDC. GASTER.

Telegraphic Branch,
28th November 1888.

Read—A memorandum from the Marine Superintendent reporting that since the last meeting seven logs had been received, six of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. Alex. Clark -	S.S. "Cardiganshire."	June 21—Nov. 22, 1888.	China, Japan, and home, viâ Suez.	——
Capt. W. C. Crutchley, R.N.R.	S.S. "Kaikoura"	July 28—Nov. 11, 1888.	New Zealand and home, viâ Capes.	1887, p. 34.
Capt. A. Hart-Dyke	S.S. "La Plata"	June 21—Nov. 13, 1888.	Buenos Ayres and home (2 voyages).	——
Comr. W. U. Moore, R.N. Lieut. A. F. Balfour, R.N.	H.M.S. "Rambler."	May 1—Aug. 31, 1888.	Surveying in China Sea -	1888, p. 31.
Capt. Moses Parry -	S.S. "Prydain"	April 9—Oct. 21, 1888.	Trading to Black Sea Ports.	1888, p. 18.
Capt. H. C. Rigaud	S.S. "Derwent"	April 14—Oct. 23, 1888.	West Indies and home (2 voyages).	——

Mr. Scott was instructed to present the Charts (O. 27) to Captains Clark, Hart-Dyke, and Rigaud, and to convey the best thanks of the Council to the other observers.

Submitted—The Barometer Range Chart (Minutes, p. 43).

Submitted—A specimen of the new form for the Weekly Weather Report (Minutes, p. 18).

The form was approved. The isobar for 29·9 inches (=760 mm.) to be made darker than the others.

116, *Victoria Street, December* 12, 1888.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN. | MR. GALTON.
PROFESSOR DARWIN. | MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the two last meetings (November 21 and 28) were read and confirmed.

The subject of the recommendations made by the respective inspectors, as regards the Fishery Barometers (Minutes, pp. 61-63), was considered, and the Secretary was instructed to carry these out, as far as practicable.

Mr. Scott drew the attention of the Council to the desirability of calculating the mean hourly values of observations for the seven observatories (Minutes, 1878, p. 23).

Mr. Buchan stated that he was prepared to place at the disposal of the Office the calculated hourly results for the barometer for the years 1874–1879. This offer was accepted with thanks.

Mr. Scott stated that there were in the Office such results for 1876, for pressure and temperature, calculated by Mr. H. S. Eaton; and, *for the barometer only*, for the years 1877 to 1880, by Mr. F. C. Bayard.

It was resolved that the mean monthly hourly results for barometrical pressure and air temperature be calculated for the year 1883, being the last year for which the hourly records for the seven observatories are published. The work to be done outside the Office.

Read—Letter 2433 from Mr. Cullum, stating that the electrical anemograph was working fairly continuously. Mr. Scott stated that the records of the instrument, from the time it had been erected at Valencia, had been received, and that they did not show much accordance with those of the ordinary anemograph on the roof of the observatory.

The Council having examined these records, Mr. Scott was instructed to desire Mr. Cullum (P.C. 2577) to report as to the possibility and probable cost of erecting the electrical instrument temporarily beside the ordinary anemograph, so as to compare their actions under the same conditions.

Read—A memorandum from the Marine Superintendent reporting that since the last meeting six logs had been received, five of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. S. P. H. Atkinson.	Barque "Priorhill."	Dec. 5, 1887—Nov. 18, 1888.	To Algoa Bay, Port Lyttelton, and home.	1887, p. 48.
Capt. H. Campbell -	"Zemindar" -	Feb. 17—Nov. 16, 1888.	To Calcutta, and home -	1887, p. 47.
Lieut. and Commr. A. M. Field, R.N.	H.M.S. "Dart"	May 1—Aug. 31, 1888.	Surveying on the Australian Station.	1888, p. 44.
Capt. A. McLean -	S.S. "Concordia."	May 18—Oct. 30, 1888.	Between Montreal and Glasgow (five voyages).	1888, p. 24.
Capt. W. H. Milner	S.S. "Avon" -	Sept. 2—Nov. 21, 1888.	West Indies, and home -	1888, p. 45.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Report on Inspections, 1888.

Telegraphic Reporting Stations.

Dungeness, December 5th, 1888.—The instruments generally were in good order. One of the stays of the rain-gauge funnel had gone, which prevented it from being quite horizontal; this Mr. Curnow promised to have repaired.

The four light-keepers take it in turns to have charge of the high or low light, two to each light. The two in charge of the high light take the observations; they change at noon on Fridays. Messrs. Curnow and Batton were on duty during my visit, and seemed to understand the work well. They both set and read the barometer rightly.

Messrs. Jenkin and Cutting are the other two light-keepers. I asked Messrs. Curnow and Batton to go through the instruments with them when they came on duty, so as to insure that the others are as correct as themselves.

Hurst Point, November 12th.—The barometers agreed well, and the observer was very correct in his reading. The thermometers were very correct excepting the minimum and spare one, which had errors of —·8 and —·7 respectively.

It was blowing a gale and raining heavily, and the markings of the thermometers were very indistinct, so that my comparisons here were not so good as they generally are. I requested Mr. Appleton to *blacken the scales* and compare the thermometers again on a lighter and quieter day, and to send in the result to the Office.

Both Mr. Appleton and Mr. Gentry, who acts in his absence, seem well up in the work.

Jersey, November 14th.—The barometers agreed well, and the observer's reading agreed with my own to a thousandth. The thermometers were generally higher than the standard, the dry-bulb had a large error (— ·7), and the spare one was 1°·1 too high; this Mr. Ley had detected, and had made it the spare one on that account. Mr. Fisher seemed to understand his work very well; he has not been able to find anybody to act for him in case of his absence, but says he never goes away.

The sunshine recorder had been shifted to a suitable place on Mt. Leroux. I tested its accuracy as well as I could with compass and level. The sun was not shining. It seemed to be correct. The card is changed by Mr. Fisher's father-in-law a quarter of an hour after sunset.

Report of Inspection of some English Stations in 1888.

Scilly (*St. Mary's*), November 7th.—Mr. Thomas did his work well, and his son, a bright boy of 16, read and corrected the barometer rightly.

The barometers agreed well, and it will be seen that Mr. Thomas's readings agreed with mine. All the thermometers excepting the minimum had large minus errors. The index of the minimum

had slipped to 32°. Mr. Thomas said it had done so before, so I raised the bulb end a little by tying a thick piece of string round its rest.

The anemometer is much exposed, and moisture unavoidably gets into its works whilst the paper is being changed. Would advise that a second barrel be provided on which the paper can be fixed in a sheltered place, then the glass door need only be open during the short time required for changing the barrel. Would construct a sheltered place under the ladder where the barrel might be prepared. Mr. Thomas tells me that the paper sometimes gets so wet that the pencil tears it. I think this exposure accounts for the defective markings which are complained of.

North Shields, November 22nd, 1888.—The observations seem to be very carefully taken, and Mr. Irvine takes great interest in the work; he is well represented by Messrs Clarke and Moat in his absence. One of these gentlemen set and read the barometer quite correctly in my presence.

The wet-bulb thermometer was rather loosely fitted; re-fitted it, and explained the best method to Mr. Irvine.

The rain-gauge funnel was partially choked by what was supposed to be a pebble; Mr. Irvine said that boys sometimes pitch stones into it from a distance, though it is in a locked square. It had to be taken to a plumber to be rectified.

The anemometer seemed in good order, and Captain Harrison showed me how he managed it and its record.

Spurn Head, November 24th, 1888.—The instruments were in good order.

Went through the special questions on the notes with Mr. Watson, and found that he quite understands how to carry up the last decimal point of the barometer. He read and corrected the barometer to M.S.L. and 32° quite rightly. Unfortunately the assistant keeper (Mr. Grainger), who acts in Mr. Watson's absence, had had an accident, and I could not test his powers.

The rain-gauge glass is badly cracked.

Yarmouth, November 27th, 1888.—The barometers differed about ·03, but they seemed to work well, and to be in good order.

The maximum thermometers read too high, but it was probably due to the water having been colder than the air, and the index not having been shaken down before reading. I am afraid this may have affected my maximum readings in other cases, as I was not sufficiently careful on that point.

The wet-bulb was very dirty though moist. I re-fitted it and explained how it should be done in future.

The rain-gauge was 3 feet 5 inches above the ground, which seemed necessary on account of neighbouring walls.

The pen of the self-recording aneroid made too coarse a line, it seemed to be too full. Took a little ink out.

The anemometer seemed to work very well. Mr. Watson pointed out a good place for a sunshine-recorder on the roof of the Sailors Home, if such observations were needed in that neighbourhood.

York, November 21st, 1888.—The reporting barometer seemed to work well; the check (No. 138) read about ·16 too low, and had been fixed at one reading for some time. The new barometer which I took down had so much loose quicksilver about it when I opened the box, that I concluded it was broken, and did not put it up, as there was but little daylight left for comparing the thermometers, &c. Found the wet-bulb thermometer very roughly fitted; re-fitted it and explained how it should be done.

For note on sunshine recorder, see Stations of the Second Order report.

Weekly Weather Report Station.

Arlington Court, November 10th, 1888.—There was no barometer at this station. The thermometers were fairly correct. The wet-bulb was not well fitted, but I re-fitted it in the presence of Mr. Carter, the head gardener, who looks after the instruments, and seemed very willing to do his best.

Stations of the Second Order.

Eastbourne, December 7th, 1888.—The instruments are placed as explained in the last report. They belong (I understand) to the town authorities.

The anemometer is on the inland-side of a round tower, and does not project much above its edge, so that I should think its winds are much affected by the tower.

The barometer has a defective vernier which needs repair, and I advised Mr. Sheward to compare it with another available barometer for a week, so as to find the differences, and then to send *his* instrument to be repaired, using the other in its place.

The wet-bulb was dirty and not well fitted.

The rain-gauge is iron and very rusty, with a copper or brass rim; its frame is defective, having one side driven in by a stone which had been thrown at it, but it works correctly. The pipe of the funnel was curved, which must make it very liable to be choked; I could not *see* but blew through it.

The solar radiation thermometer and sunshine recorder are on the top of a high hotel. Mr. Sheward objects to going to record the thermometer or to change the card of the recorder unless there has been sunshine in the day. He considers that by meaning the observations of the solar

radiation sheet, on days when there has been no sunshine, with those when there has been sun shine, unfairly lowers the mean for Eastbourne, for which he seems very jealous. He also complains of the height he has to go. The sunshine recorder differs much from the one in use by the Office; it was made by Negretti and Zambra. Mr. Sheward elevates and depresses it about twice a year to bring the burning well on the card. It was set at 56° 20′ when I inspected it. It was burning well, and the burnt line was running apparently parallel to the edge of the card. The noon line of the card was placed about half an hour to the left of the noon mark on the instrument; this Mr. Sheward confesses was the result of his fixing the card in the dark. At 1h. 20m. local apparent time, the sun burnt the 1h. 30m. line. It was very poorly placed, being on the head of a dry goods cask, off which most of the hoops had fallen. It is impossible that an instrument *so* placed can keep in order. Its W. side was low; I wedged it up. The square foundation of the instrument was very heavy, and probably iron or lead.

I have appended to my inspection notes an explanatory letter from Mr. Sheward, which may be useful to future inspectors.

Epsom, December 11th, 1888.—Found the instruments at this station well placed and generally in good order. The damp-bulb was not well fitted and it was dirty; re-fitted it with fresh cambric and lamp cotton, and explained how it should be done in future.

The direction of the wind had been observed by holding up a pocket-handkerchief. Drew a *true* north and south line, and explained how the direction of the wind is better got by considering the motion of the *lowest* clouds and of smoke, as well as by its direct action on the observer himself.

Mr. Jackson seemed anxious to do good work, and he has an able and willing assistant in Mr. Montgomery, one of the senior pupils. Mr. Jackson's college work is increasing, and he finds it more and more difficult to devote his own time to meteorological work.

Market Rasen, November 26th, 1888.—Mr. Jevons, who is a chemist in the town, did not give any particular reason for stopping his observations, but promised to commence regularly on December 1st. He quite understood the work, and will, I think, become a good observer. One of his assistants undertakes the work in his absence. His instruments are in good order and well placed.

St. Leonards, December 6th, 1888.—Dr. Colborne's instruments were well placed, and he read them very correctly.

He was taken ill in April, and then ceased observing at 9 p.m. He hopes to get the assistance of the gardener who is in charge of the public garden where the thermometers are placed, and to start regularly the 9 p.m. observations again. He is paid something by the town authorities for this work.

The sunshine recorder is somewhat out in adjustments, but it is so firmly cemented on to an iron pillar that it cannot be adjusted. In some cases the observer is obliged to slip the card into the lower part of its groove *only*, otherwise the focal point would fall on the frame instead of on the card. It was well placed in the Waterworks, and had a good range. The man in charge of the works looked after it; he seemed very intelligent.

Southampton, November 13th, 1888.—The barometer was poorly placed for bringing the quick-silver up to the ivory pointer, but Mr. Cook seemed to find no difficulty, and our readings of the vernier agreed. The maximum thermometer had rather a large error.

Everything was in first rate order at this station, and Mr. Cook takes great interest in the work.

Ketton Hall, Stamford, November 26th, 1888.—The instruments here belong to Mr. Coventry, who has been living with his brother-in-law, Mr. Hopwood, the owner of the place. Mr. Coventry is about to leave the place, and thinks it probable he will leave the instruments with the head gardener.

When I arrived, both Mr. Coventry and the head gardener (Mr. Divers) were absent. Mr. Tunnington, the second gardener, took me round.

The barometer was locked up in the head gardener's house, and not available. The thermometers had very small errors.

Mr. Coventry arrived before I left, and told me he applied no errors to his printed observations.

As Mr. Coventry was about to leave the neighbourhood and he had not decided what he should do with the instruments, I did not think it advisable to spend another day merely to see the barometers. Mr. Tunnington, the second gardener, seemed very intelligent. He wished they had a sunshine recorder, showing that he was not afraid of the work.

York, November 21st, 1888.—I found the instruments at this station in fair order, except the wet-bulb, which was roughly fitted. See Telegraphic Station report.

The sunshine recorder was supported by rough wooden legs over the ridge of the roof of a school; it was kept in position by wire braces. It was cemented firmly into a frame which made it impossible to adjust it. It was much out in level E. and W. I think it should have a much firmer foundation to stand upon, and that it should not be cemented into a frame, but that space should be left for slight adjustments, which I am inclined to think would be best done by screws worked by means of a key which could be taken away. The position was rather difficult of access, but it seemed to have a good range. Unfortunately, Mr. J. E. Clark, who has charge of the instrument, was absent, but it was shown to me by an intelligent scholar who helps him.

(Signed) HENRY TOYNBEE.

BAROMETER and THERMOMETER READINGS.

NAMES OF STATIONS.	BAROMETER. Difference of Observer's from Inspector's Readings.	THERMOMETER. Temperature in Water.	DRY BULB. Correction to reduce to Inspector's Standard.	WET BULB. Correction to reduce to Inspector's Standard.	MAXIMUM. Correction to reduce to Inspector's Standard.	MINIMUM. Correction to reduce to Inspector's Standard.	SPARE OR GRASS. Correction to reduce to Inspector's Standard.	NAMES OF STATIONS.
Scilly (St. Mary's)	0	53°·2	−°·8	−°·7	−0°·9	−°·3	−0°·9†	Scilly (St. Mary's).
Arlington Court -	No barom.	47·5	− ·1	− ·4	− ·1	+ ·4	None	Arlington Court.
Southampton -	0*	52·5	− ·5	− ·6	−1·0	0	− ·3‡	Southampton.
Hurst Point -	− ·001	52·2	− ·2	− ·2	0	− ·8	− ·7§	Hurst Point.
Jersey - -	− ·001	54·6	− ·7	− ·3	− ·4	− ·1	−1·1§	Jersey.
York - -	+ ·001	50·0	−1·0	− ·7	−1·0 (a.m. 8) −0·5 (p.m. 9)	0 (a.m. 8) 0 (p.m. 9)	None	York.
North Shields -	+ ·001	49·9	− ·3	− ·1	− ·2	+ ·9	− ·1§	North Shields.
Yarmouth -	0	49·2	0	− ·5	−1·8	+ ·4	− ·1§	Yarmouth.
Spurn Head -	+ ·001	52·4	− ·6	− ·5	− ·4	− ·2	None	Spurn Head.
Market Rasen -	0	44·5	− ·1	− ·4	− ·8	+ ·6	− ·6§	Market Rasen.
Ketton Hall -		48·0	+ ·2	+ ·2	+ ·1	+ ·4	Not put in water.‡	Ketton Hall.
Dungeness -	+ ·004	55·1	− ·1	− ·1	0	− ·1	None.	Dungeness.
St. Leonards -	0	52·7	− ·5	− ·7	− ·1	0	None; grass min. used as min.	St. Leonards.
Eastbourne (vernier defective).	− ·003	53·1	− ·1	− ·1	− ·4	0	None	Eastbourne.
Epsom - -	− ·002	51·0	− ·6	− ·2	0	− ·3	−0·3§	Epsom.

* This merely relates to the setting of the vernier, the setting of the ivory point was too obscure to me, as the surface of the quicksilver was too cloudy to cast a reflection. Mr. Cook did it by actual contact and seemed correct.
† Used for sea water. ‡ Grass minimum. § Spare.

REPORT OF INSPECTIONS (ENGLAND).

Prestwich, a Weekly Weather Report and Second Order Station.—Inspected on December 3rd. Barometer has been shifted to a better position; thermometers are in an exceptionally good position and are very good instruments. Rain-gauge fairly good and well exposed. The minimum thermometer was slightly out of order, but this was soon rectified. Observer appears to take great interest in the work.

Barrow-in-Furness, a Telegraphic Reporting Station.—Inspected on December 5th. Barometer had air in tube which I expelled; tube, however, requires "re-boiling" as soon as arrangements can be made to have it done. Thermometer screen needs moving to a more open position. Rain-gauge worn out; new one at once supplied by observer. Wind observations (though apparently defective at first sight) are, I believe, quite accurate.

The testing of the thermometers seems to show that the following corrections are necessary to reduce their indications to true values:—

	Dry Bulb.	Wet Bulb.	Max.	Min.	Terrest. Rad.	Temp. at Time.	Time in Water.
Prestwich - -	−0°·5	−0°·3	−0°·1	−0°·4	−0°·2	46°·7	1 hour.
Barrow-in-Furness -	−0·7	−0·5	−0·6	−0·1	—	52·1	1 hour.

FREDC. GASTER.

SIR, Meteorological Office, December 11, 1888.

I BEG to hand you herewith my report and inspection notes respecting the Stations of the Second Order at Uttoxeter and Sutton Coldfield.

Uttoxeter, October 5th.—This is a new station. The barometer is a good one, but the thermometers are all unverified instruments, and are not graduated on the stems. The screen is a rough

imitation of Stevenson's, and was not well exposed. The rain-gauge was not firmly fixed and the measuring glass was damaged. At present the evening observations are so frequently omitted as to render the station almost useless, and I fear this difficulty cannot be overcome.

Sutton Coldfield, November 21st.—This is also a new station, but with a complete set of excellent instruments, the property of the Corporation. The barometer is hung in the town hall, on the tower of which (70 feet high) is a small anemometer, and a Jordan Sunshine Recorder. The thermometers and rain-gauge are on the lawn in front of the observer's house, about half a mile from the town hall. The screen was painted green at the time of my visit, but will be painted white. The observer (Mr. Fletcher, C.E., borough surveyor), takes great interest in the work. He is very willing to supply tabulations of sunshine if desired to do so.

The following table shows the results of the thermometric comparisons:—

Corrections to be applied to the reading of—

Stations.	Dry.	Wet.	Max.	Min.	Spare.	Remarks.
Uttoxeter - - -	+·4	+1·2	—	—	+·3	
Sutton Coldfield - -	−·1	−·1	−·1	−·1	—	

(Signed) JOHN A. CURTIS.

R. H. Scott, Esq., F.R.S.

Reported—That the following boys had been appointed:—

S. Bristow, at 12*s.* 6*d.* per week.
H. A. Hewitt, at 10*s.* per week.

Resolved—That the usual bonus of 3*l.* 3*s.* be given to those of the telegraphic reporters who have discharged their duties satisfactorily during the year. (Minutes, 1887, p. 96.)

Mr. Scott was authorised to print the Report of the Zürich Meeting of the International Meteorological Committee, as he had done in the case of the previous meetings.

Reported—That the Committee of the Athenæum Club had offered to supply the Office with the records of their self-recording aneroid, dating from May last (Letter 2316), and that the offer had been accepted.

Submitted the following:—

LIST of STORM WARNINGS issued to the COASTS of the BRITISH ISLANDS since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate Time of their occurrence), and the Result—as to the character of the Warning.

1. WARNINGS ISSUED.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any) and approximate Time of Occurrence.	Result.* Character of Warning.
1888.				
Nov. 28th, 10.15 a.m.	Ireland, S. - -	South cone	Moderate N.Ely. gale, on 28th -	B
„ „ -	England, W. -	„	Fresh S.Ely. gale, on 29th -	A
„ „ -	„ S.W. -	„	Neither gales nor strong winds -	C
„ „ -	„ S. -	„	Moderate Sly. gale, night of 28th -	B
„ „ -	„ S.E. -	„	Strong S.Ely. winds, on morning of 29th.	B
Nov. 29th, 10.10 a.m.	Scotland, E. -	North cone	Strong E. and S.Ely. winds, night of 29th.	B
„ „ -	„ W. -	„	„ „ „ -	B
„ „ -	England, E. (northern part).	„	No further increase of wind after issue of warnings.	C
Dec. 1st, 3.15 p.m. -	Scotland, E. (northern part).	South cone	Strong Sly. winds, night of 1st, and again on 3rd.	B
„ „ -	„ W. -	„	Strong Sly. winds and moderate gales, on 3rd.	B

* A = complete success (*i.e.*, justified by gales of force 8 or more by Beaufort's scale).
B = partial „ („ strong winds, force 6 or 7, by Beaufort's scale).
C = failure (*i.e.*, not justified by either gales or strong winds).

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result. — Character of Warning.
Dec. 2nd, 9.30 a.m. -	Ireland, S. - -	South cone	Fresh Sly. gale, on 3rd - -	A
„ „ -	„ E. - -	„	Moderate to fresh Sly. gales, on 3rd	A
„ „ -	England, N.W. -	„	„ „ „ -	A
„ „ -	„ W. -	„	Moderate to fresh Sly. gale, night of 2nd and on 3rd.	A
„ „ -	„ S.W. -	„	„ „ „ -	A
Dec. 3rd, 7 p.m. -	Scotland, E. -	South cone	Neither gales nor strong winds -	C
„ „ -	„ W. -	„	„ „ „ -	C
„ „ -	England, S. -	„	No further increase of wind after issue of warnings.	C
„ „ -	„ S.E. -	„	„ „ „ -	C
„ „ -	„ E. -	„	„ „ „ -	C
Dec. 4th, 7 a.m. -	Ireland, S. - -	South cone	No further increase of wind after issue of warnings.	C
„ „ -	„ E. -	„	Neither gales nor strong winds -	C
„ „ -	England, N.W. -	„	„ „ „ -	C
„ „ -	„ W. -	„	Moderate Sly. gales, morning of 5th	B
„ „ -	„ S.W. -	„	„ „ „ -	B
Dec. 6th, 7.25 p.m. -	Ireland, S. - -	South cone	No further increase of wind after issue of warnings.	C
„ „ -	„ E. -	„	Strong Sly. winds, night of 6th -	B
„ „ -	Scotland, E. -	„	Strong Sly. winds, morning of 7th -	B
„ „ -	„ W. -	„	„ „ „ -	B
„ „ -	England, N.W. -	„	Strong S.Ely. and Sly. winds, on 7th	B
„ „ -	„ W. -	„	Strong Sly. winds, morning of 7th -	B
„ „ -	„ S.W. -	„	Neither gales nor strong winds -	C
„ „ -	„ S. -	„	„ „ „ -	C
„ „ -	„ S.E. -	„	„ „ „ -	C
„ „ -	„ E. -	„	„ „ „ -	C
Dec. 10th, 10.30 a.m. -	Ireland, S. - -	South cone	Strong winds and moderate gales from S.E., on 10th.	B
„ 7.30 p.m. -	„ E. - -	„	Strong Sly. winds, morning of 11th	B
„ „ -	Scotland, W. -	„	„ „ „ -	B
„ „ -	England, N.W. -	„	Neither gales nor strong winds -	C
„ „ -	„ W. -	„	Strong Sly. winds, morning of 11th	B
„ „ -	„ S.W. -	„	No increase of wind after issue of warnings.	C

SUMMARY.

A + B - - - - - - 24
C - - - - - - 17

2. GALES FOR WHICH NO WARNING WAS ISSUED.—None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
December 12, 1888.

Submitted—The following statements of work during November 1888:—

MARINE BRANCH.

December 12, 1888.

Examined 19 new logs and 2 lighthouse registers.

Discussion of cyclones in the Arabian Sea in May and June 1885. A key chart of the area prepared for lithography.

Discussion of Red Sea data from Admiralty logs.

Plotting additional information from Office and Admiralty logs in the neighbourhood of Cape Guardafui.

Preparing and plotting Ocean currents from Office and Admiralty logs.

Drawing specimen charts showing the annual mean barometric pressure and seasonal range.

Copying rough books kept on the ship "Candahar" (7297), and the yacht "Lancashire Witch" (7325).

Copying hydrographical notices from logs 7332 and 7334.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH (to 30th November 1888).

Monthly Weather Report:—

1887. Same as at date of last report.

1888. Tables and rough maps for October prepared. Reports for other months same as at date of last report.

Weekly Weather Report:—

All numbers issued promptly. Appendices all well up to date.

New form. Charts ready, and arrangements complete for issue from first week in January.

Daily Weather Report:—Issued promptly to date, with monthly correction sheet for October.

Inspection Notes for England re-examined and brought up to date; the inspection notes received have been acted on. New instructions as to the use of S.R. aneroid have been prepared and issued, and much time has been devoted to examining the question of erroneous reports and instructing observers; the advantage of this is evident in several cases.

Plotting of Daily Telegrams from the United States.—Done to date.

Investigation as to Prevalence of Fog over the United Kingdom.—In progress. About 3¼ years of values are now done, but progress is necessarily slow owing to the steady increase of routine work in this Department.

Primary Checking of Storm Warnings.—Done to date.

The weather during the month has been very rough and unsettled, and under these circumstances little of my own and Mr. Brodie's time is available for other than the storm warnings and forecast work.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

December 1st, 1888.

Observatory Returns.—The revision of proofs of Part I., 1886, nearly completed. The calculation of the daily and monthly means, and of the Hourly Vapour Tension Values for April 1886, completed but not checked, and the copying of the Hourly Readings for press commenced.

Quarterly Weather Report.—Part IV., 1879, completed, and all letterpress and plates sent to printer.

Harmonic Analyser.—The analysis of the barograms for 1880 completed, and the curves for 1881 commenced. The coefficients for Greenwich recently calculated were slightly altered in form.

Miscellaneous.—The calculation of the means required for the Annual Report of the Kew Committee occupied the greater part of the month. The drawing of diagrams to illustrate Mr. Bayard's tables of diurnal range begun, and proof of the tables read and corrected. Proof of the new instructions for adjusting sunshine recorders read and revised. Two months' sunshine cards stamped and dated.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EAMINATION ROOM.

December 1st, 1888.

Examinations.

November 1886.—Completed.

December 1886.—*Thermograms* and *barograms.*

Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

November 1886.—"*Notes of Errors*" to all observatories.

October 1887 *to September* 1888.—"*Notes of Errors*" (*bar.* and *ther.*) to Kew.

Miscellaneous.

Copying of Glasgow barograph tabulations No. 12, 1869 and 1871, and thermograph tabulations No. 12, 1871 (2), and 10 and 11, 1873.

Preparing "Diary of Operations," 1889.

(Signed) T. E. ALLEN.

Submitted—The following report on the forecasts for November 1888:—

The letters used have the following signification:—

a=complete success.
b=partial (*i.e.* more than half) success.
c=partial failure.
d=total failure.

NOVEMBER.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	52	72	62	88
"	b	36	16	26	
"	c	8	4	6	
"	d	4	8	6	
SCOTLAND, E.	a	52	63	58	90
"	b	32	33	32	
"	c	8	4	6	
"	d	8	0	4	
ENGLAND, N.E.	a	52	50	51	80
"	b	20	38	29	
"	c	28	0	14	
"	d	0	12	6	
ENGLAND, E.	a	52	42	47	82
"	b	32	38	35	
"	c	12	8	10	
"	d	4	12	8	
MIDLAND COS.	a	44	42	43	80
"	b	32	42	37	
"	c	16	16	16	
"	d	4	0	2	
ENGLAND, S.	a	52	42	47	90
"	b	36	50	43	
"	c	12	4	8	
"	d	0	4	2	
SCOTLAND, W.	a	28	60	44	80
"	b	44	28	36	
"	c	24	4	14	
"	d	4	8	6	
ENGLAND, N.W.	a	40	80	60	86
"	b	36	16	26	
"	c	20	0	10	
"	d	4	4	4	
ENGLAND, S.W.	a	56	56	56	86
"	b	24	36	30	
"	c	16	4	10	
"	d	4	4	4	
IRELAND, N.	a	60	68	64	90
"	b	28	24	26	
"	c	12	4	8	
"	d	0	4	2	
IRELAND, S.	a	40	52	46	84
"	b	44	32	38	
"	c	12	16	14	
"	d	4	0	2	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	47	70	59	89
"	b	40	20	30	
"	c	7	3	5	
"	d	6	7	6	
SCOTLAND, E.	a	57	60	59	87
"	b	30	27	28	
"	c	3	3	3	
"	d	10	10	10	
ENGLAND, N.E.	a	50	64	57	87
"	b	40	20	30	
"	c	10	3	7	
"	d	0	13	6	
ENGLAND, E.	a	33	38	36	78
"	b	40	45	42	
"	c	20	3	12	
"	d	7	14	10	
MIDLAND COS.	a	30	38	34	80
"	b	43	48	46	
"	c	20	7	13	
"	d	7	7	7	
ENGLAND, S.	a	47	42	45	85
"	b	33	48	40	
"	c	17	10	14	
"	d	3	0	1	
SCOTLAND, W.	a	24	43	34	69
"	b	43	27	35	
"	c	23	13	18	
"	d	10	17	13	
ENGLAND, N.W.	a	47	60	54	89
"	b	40	30	35	
"	c	10	3	6	
"	d	3	7	5	
ENGLAND, S.W.	a	41	62	52	76
"	b	24	24	24	
"	c	28	14	21	
"	d	7	0	3	
IRELAND, N.	a	42	62	52	83
"	b	31	31	31	
"	c	17	4	11	
"	d	10	3	6	
IRELAND, S.	a	39	61	50	79
"	b	32	25	29	
"	c	18	14	16	
"	d	11	0	5	

SUMMARY.

BRITISH ISLES	a	48	57	53	85
"	b	33	32	32	
"	c	16	6	11	
"	d	3	5	4	
BRITISH ISLES	a	41	55	48	82
"	b	36	31	34	
"	c	16	7	11	
"	d	7	7	7	

Submitted—The following Statement respecting the Records for July—December 1886 from the Self-recording Observatories (see Minutes, 21st December 1868, 20th November 1876 and 3rd January 1883) :—

July—December 1886.	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH :—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity
Action of Instrument	Good.	Good.	Good.	Indifft.	Good.	Good.	Good.	Good.	Good.	Good
Records deficient :—										
Due to stoppage of clock	0	0	0	0	0	0	0	0	0	0
„ other causes	3 hrs.	4 hrs.	0	0	11 hrs.	13 hrs.	0	162 hrs.	7 hrs.	8 hrs.
Number of errors discovered :—										
By general examination	0	0	0	51	3	6	3	9	2	8
Results of 40 *Remeasurements :—*										
Greatest difference	1·0	2·0	2·0	2·0	1·0	2·0	1·0	2·0	1·0	3·0
Mean difference irrespective of sign	0·1	0·5	0·1	0·4	0·1	0·4	0·1	0·5	0·1	0·6
Residual difference (—Meteorological Office)	0·0	0·0	0·0	+0·1	0·0	+0·1	0·0	0·0	+0·1	+0·1
Orientation verified	Monthly	—	Monthly	—	Monthly	—	Monthly	—	Monthly	—
RAIN GAUGE:—										
Action of Instrument	Good.		Good.		Good.		Good.		Good.	
Records deficient :—										
Due to stoppage of clock	111 hrs.		0		0		0		0	
„ other causes	0		0		0		1 hr.		22 hrs.	
Number of errors discovered :—										
By general examination	1		6		12		1		7	

——	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH :—				
Action of Instrument	Good.	Good.	Good.	Good.
Character of Photography	Do.	Do.	Do.	Fair.
Records deficient :—				
Due to stoppage of clock	2 hrs.	0	10 hrs.	15 hrs.
„ failure of light	2 hrs.	0	2 hrs.	7 hrs.
„ other causes	11 hrs.	10 hrs.	8 hrs.	17 hrs.
Number of errors discovered :—				
In entry of standards	—	17	1	2
„ calculating residuals	—	9	1	0
„ applying „	—	3	2	47
By general examination	—	7	7	44
Results of 40 *Remeasurements :—*				
Greatest difference	—	·008	·009	·009
Mean difference irrespective of sign	—	·003	·003	·003
Residual difference (—Meteorological Office)	—	+·001	+·001	—·001
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	—	·002	·002	·002

THERMOGRAPH :—	Aberdeen.		Falmouth.		Kew.		Valencia.	
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Do.		Do.		Fair.	
Records deficient :—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	2 hrs.	2 hrs.	0	0
„ failure of light	2 hrs.	2 hrs.	0	0	5 hrs.	5 hrs.	3 hrs.	3 hrs.
„ imperfectly moistened bulbs	—	10 hrs.	—	0		13 hrs.	—	2 hrs.
„ partially frozen bulbs	—	62 hrs.	—	30 hrs.	—	66 hrs.	—	17 hrs.
„ other causes	14 hrs.	7 hrs.	19 hrs.	19 hrs.	68 hrs.	6 hrs.	9 hrs.	8 hrs.
Number of errors discovered :—								
In entry of standards	0	0	6	10	2	3	6	5
„ maxima and minima	1	—	9	—	13	—	8	—
By general examination	0	0	1	0	5	3	1	0
Results of 40 *Remeasurements :—*								
Greatest difference	0·3	0·2	0·3	0·4	0·3	0·4	0·5	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·2	0·1
Residual difference (—Meteorological Office)	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·2	0·2	0·1	0·2	0·1	0·2	0·1	0·1

General Notes.

Aberdeen.

Rain-gauge.—Traces very faint.

Barograph.—The standards have had to be rejected, owing to the slipping of the attached thermometer and consequent doubt as to correction for temperature. Attention was repeatedly drawn to the unsatisfactory residuals, but observer failed to notice this defect.

Thermograph.—Sufficient attention was not given to the wet-bulb during periods of frost.

Armagh.

Anemograph.—Velocity trace intermittent at low rates due to a mechanical defect.

Falmouth.

Anemograph.—Pricker bent traces marking 10′ late.

Rain-gauge.—The attachment of curves was very indifferent.

Kew.

Anemograph.—The large loss of velocity trace was due to the oil in the bearings becoming congealed, owing to low temperature.

Rain gauge.—The attachment of the curves was very indifferent owing partly to the use of old forms. The action of the pencil was irregular at times.

Barograph.—The regulation of the clock very unsatisfactory.

Valencia.

The photography and attachment of curves, generally, were very indifferent at this observatory.

(Signed) T. E. Allen.

Reported—That the following cheques had been drawn for the month of November :—

1888.		£	s.	d.
Nov. 3rd.	J. S. Harding, jun., for payment of weekly salaries	14	18	0
„ 5th.	Utrecht M.O., telegrams	*15	11	0
„ 10th.	J. S. Harding, jun., for payment of weekly salaries	14	18	0
„ 17th.	„ „ „	14	18	0
„ „	„ petty cash	20	0	0
„ 20th.	Captain H. Toynbee, inspections	22	17	4
„ „	Paris M.O., telegrams	*4	7	0
„ „	Hamburg M.O., telegrams	*18	0	11
„ 21st.	R. W. Munro, fittings to electrical and Dives's anemometers	6	11	0
„ „	Kew Committee, experiments and repairing old Armagh instruments	70	0	5
„ „	Postmaster-General, telegrams	105	10	9
„ „	A. Buchan, salary	75	0	0
„ „	„ travelling expenses	34	8	10
„ „	T. W. Baker, „	23	7	4
„ „	G. M. Whipple, „	43	5	11
„ „	R. Strachan, aneroid (bought on commission)	4	11	6
„ 24th.	J. S. Harding, jun., for payment of weekly salaries	14	18	0
„ 30th.	R. H. Scott, Secretary	66	13	4
„ „	J. S. Harding } Office salaries	27	15	6
„ „	T. D. Bell } Office salaries	16	5	0
„ „	Captain H. Toynbee, pension	12	0	0
„ „	J. Sheerman, salary, harmonic analysis	11	5	0
„ „	J. E. Cullum, salary (Valencia Observatory)	19	3	4
„ „	R. H. Curtis } Salaries (discussion, &c. of observations).	22	18	4
„ „	J. A. Curtis } Salaries (discussion, &c. of observations).	18	15	0
„ „	T. E. Allen } Salaries (discussion, &c. of observations).	16	13	4
„ „	C. H. Thompson } Salaries (discussion, &c. of observations).	12	10	0
„ „	S. Call } Salaries (discussion, &c. of observations).	12	1	8
„ „	R. G. Canham } Salaries (discussion, &c. of observations).	7	18	4
„ „	A. H. Bell } Salaries (discussion, &c. of observations).	7	18	4
„ „	L. H. Powers } Salaries (discussion, &c. of observations).	4	11	8
	Carried forward	£759	12	10

* Paid by draft on a foreign banker.

			£	s.	d.
1888.		Brought forward - - -	759	12	10
Nov. 30th.	F. Gaster - - -	Salaries (preparation, &c. of Weather Reports).	25	15	7
,, ,,	F. J. Brodie - - -		18	15	0
,, ,,	G. G. Francis - -		18	5	7
,, ,,	A. J. Rigby - - -		17	16	3
,, ,,	R. Sargeant - - -		12	13	1
,, ,,	A. R. Simpkins - -		10	6	3
,, ,,	C. W. Heinemann - -		5	8	4
,, ,,	Nav.-Lieut. C. W. Baillie, R.N.	Salaries (discussion, &c. of observations, and care of instruments).	29	3	4
,, ,,	R. Strachan - - -		27	15	6
,, ,,	C. Harding - - -		22	18	4
,, ,,	H. Harries - - -		15	8	4
,, ,,	W. Allingham - -		15	8	4
,, ,,	W. G. James - - -		11	13	4
,, ,,	F. T. Bullen - - -		9	3	4
,, ,,	R. F. Wallace - -		9	3	4
,, ,,	J. E. Cullum, Valencia, expenses - - -		15	2	5
,, ,,	F. Gaster, for payment of accounts for extra attendance -		16	0	9
,, ,,	Scottish Meteorological Society, on account, for inspections		100	0	0
,, ,,	J. S. Harding, jun., petty cash - - - -		50	0	0
			£1,190	9	11

63, *Victoria Street, January* 9, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (December 12) were read and confirmed.

Mr. Scott read Letters 2484, 2502, and 2582, 1888, and also Letters 5, 31, 47, and 60, 1889, from Mr. Cullum, from the last of which it appeared that the electrical anemometer had been erected temporarily on the roof of the observatory, in accordance with the wishes of the Council (Minutes, p. 80). The instrument was apparently working fairly satisfactorily.

Read—The following letter:—

(M.O. 2551.)
P.W. 175422.

SIR, General Post Office, December 22, 1888.

WITH reference to former correspondence on the subject of the apparatus at Valentia, I beg leave to inform you that the apparatus has been placed in perfect working order and refixed on the wire.

I have therefore to request that you will, without delay, pay the cost of the apparatus, an account for which has been duly rendered; and also the rental for the year about to expire and the rental for the further year which will commence on the 7th proximo.

I am, &c.
(Signed) J. C. LAMB.

The Secretary, Meteorological Office.

It was resolved—

I. That the rent of 18*l.* be paid for the year ending January 7, 1889, and also for that ending January 7, 1890.

II. That a letter (P.C. 127) be written to the Postmaster General explaining that the facts, and saying that, in event of ultimate failure of the experiment, the Council will hope that the Post Office will allow the Meteorological Office to give up the wires.

Mr. Scott submitted a correspondence which he had had with the late Dr. W. Reid, of Sanchez, Samanà Bay, St. Domingo (Letters 2172, 1887 ; 48, 1586, and 2037, 1888), in the last of which letters Dr. Reid presented to the Office two volumes of meteorological observations taken by him at that station in 1886 and 1887, for publication, if the Council saw fit to print them.

Mr. Scott submitted also a memorandum by Mr. J. A. Curtis (Letter 65), containing four different schemes for publishing the information. The most condensed form was provisionally adopted.

Read—Letter 2431, from Mr. Abercromby, asking if the Council would order copies of the "Instructions for Observing Clouds" recently published by him, for the use of some of their observers.

Mr. Scott was instructed to procure six copies.

Mr. Scott reported that he proposed to employ Miss Mary Anderson and Miss E. E. Murray on the work of computing the hourly mean values of the observatory records (Minutes, p. 79). It was resolved to allow 3*s*. 9*d*. for the calculation of one month's work, 48 hourly means.

Submitted—The following :—

LIST of STORM WARNINGS issued to the COASTS of the BRITISH ISLANDS since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result, as to the Character of the Warning.

(1.) WARNINGS ISSUED.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result.* Character of Warning
1888.				
Dec. 19th, 3.10 p.m.	Scotland, E.	South cone	Neither gales nor strong winds	C
,, ,,	,, W.	,,	,, ,, ,,	C
Dec. 20th, 3.30 p.m.	Ireland, S.	South cone	Fresh Sly. gales, night of 20th	A
Dec. 21st, 2.15 p.m.	England, S.W.	South cone	Fresh to strong Wly. gales, on 22nd	A
,, ,,	,, S.	,,	Fresh Sly. and S.Ely. gales, on night of 21st.	A
,, ,,	,, S.E.	,,	,, ,, ,,	A
,, 3.15 p.m.	,, W.	,,	Fresh Sly. gales, evening of 21st	A
,, ,,	,, E.	,,	Moderate S.Ely. gale, morning of 22nd.	B
,, ,,	Ireland, E.	,,	Strong winds and moderate gales from E. and N., on 22nd.	B
,, ,,	England, N.W.(except I. of Man and Carlisle).	North cone	Strong winds and moderate gales from S.E., evening of 21st.	B
,, 7.10 p.m.	Scotland, E.	,,	Fresh Sly. and S.Ely. gales, night of 21st.	A
,, ,,	,, W.	,,	Neither gales nor strong winds	C
,, ,,	England, N.W. (I. of Man and Carlisle only).	South cone	Moderate S.Ely. gales, night of 21st	A
Dec. 23rd, 7 p.m.	Ireland, S.	South cone	No increase of wind after issue of warnings.	C
,, ,,	,, E.	,,	Neither gales nor strong winds	C
,, ,,	Scotland, E.	,,	Fresh Sly. gale, night of 23rd	A
,, ,,	,, W.	,,	Neither gales nor strong winds	C
,, ,,	England, N.W.	,,	,, ,, ,,	C
,, ,,	,, W.	,,	,, ,, ,,	C
Dec. 25th, 9.40. a.m.	Ireland, E.†	South cone	Moderate Sly. gale, on 25th	B
,, ,,	Scotland, E.	,,	Moderate to fresh S.Ely. to Sly. gales, evening of 25th.	A

* A = complete success (*i.e.* justified by gales of force 8 or more by Beaufort's scale).
B = partial success (,, ,, strong winds, force 6 or 7 ,,).
C = failure (,, not justified by either gales or strong winds).

† Information at present available for these coasts insufficient to give reliable results

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Result. Character of Warning.
1888.				
Dec. 25th, 9.40 a.m.	Scotland, W.	South cone	Moderate Wly. gale, evening of 25th	B
,, ,,	England, N.W.	,,	Fresh Sly. gale, on 25th	A
,, ,,	,, W.	,,	Fresh Wly. gale, on 25th	A
,, ,,	,, S.W.	,,	,, ,, ,,	A
,, ,,	,, S. (Channel Islands and Southampton).	,,	Strong Wly. winds, on 25th	B
,, 9.45 a.m.	,, S. (E. of Southampton).	,,	Fresh S.Wly. gales, evening o 25th	A
,, ,,	,, S.E.	,,	Strong Sly. winds, evening of 25th	B
,, ,,	,, E.	,,	,, ,, ,,	B
Dec. 28th, Noon	Ireland, S. (Galway only).	North cone	Neither gales nor strong winds	C
,, ,,	,, E.	,,	Moderate Nly. gale, evening of 28th	B
,, ,,	Scotland, E. (northern part).	,,	Neither gales nor strong winds	C
,, ,,	,, W.	,,	,, ,, ,,	C
,, ,,	England, N.W.	,,	,, ,, ,,	C
,, ,,	,, (Aberysth-with only).	,,	,, ,, ,,	C
Dec. 30th, 7 p.m.	Ireland, S. (Galway only).	South cone	Strong S.Wly. gale, night of 30th	B
,, ,,	,, E. (northern part).	,,	Neither gales nor strong winds	C
,, ,,	Scotland, E. (northern part).	,,	,, ,, ,,	C
,, ,,	,, W.	,,	Strong S.Wly. winds, on 31st	B
,, ,,	England, NW. (I. of Man and Carlisle only).	,,	Neither gales nor strong winds	B
1889.				
Jan. 4th, 10.25 a.m.	Ireland, S. (Galway only).	South cone	Neither gales nor strong winds	C
,, ,,	,, E. (northern part).	,,	,, ,, ,,	C
,, ,,	Scotland, E. (northern part).	,,	No further increase of wind after issue of warnings.	C
,, ,,	,, W.	,,	Neither gales nor strong winds	C
,, ,,	England, NW. (I. of Man and Carlisle only).	,,	,, ,, ,,	C
Jan. 7th, 7.15 p.m.	Ireland, S.	South cone	Fresh S.Ely. and Sly. gales, morning of 8th.	A
,, ,,	,, E.	,,	Fresh Sly. gales, on 8th	A
,, ,,	Scotland, E.	,,	Fresh to strong Sly. gale, night of 8th.	A
,, ,,	,, W.†	,,	Moderate Sly. gale, on 8th	B
,, ,,	England, N.W.	,,	Fresh S.Ely. gales, on 8th	A
,, ,,	,, W.	,,	Fresh Sly. gales, on 8th	A
,, ,,	,, S.W.	,,	Strong Sly. gales, on 8th	A

† Information at present available for these coasts insufficient to give reliable results.

SUMMARY.

A + B	32
C	20

(2.) THERE HAVE BEEN NO GALES EXPERIENCED FOR WHICH NO WARNINGS WERE ISSUED.

(Signed) FREDC. GASTER.

Telegraphic Branch,
January 9, 1889.

Submitted—The following report on the forecasts for December 1888:—

The letters used have the following signification:—

a=complete success.
b=partial (*i.e.*, more than half) success.
c=partial failure.
d=total failure.

DECEMBER.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	25	56	41	86
,,	b	54	36	45	
,,	c	17	0	8	
,,	d	4	8	6	
SCOTLAND, E.	a	46	64	55	88
,,	b	38	28	33	
,,	c	16	4	10	
,,	d	0	4	2	
ENGLAND, N.E.	a	48	52	50	82
,,	b	36	28	32	
,,	c	16	8	12	
,,	d	0	12	6	
ENGLAND, E.	a	44	68	56	86
,,	b	44	16	30	
,,	c	12	4	8	
,,	d	0	12	6	
MIDLAND COS.	a	40	60	50	80
,,	b	32	28	30	
,,	c	28	8	18	
,,	d	0	4	2	
ENGLAND, S.	a	56	72	64	92
,,	b	32	24	28	
,,	c	12	4	8	
,,	d	0	0	0	
SCOTLAND, W.	a	29	36	33	61
,,	b	21	36	28	
,,	c	33	16	25	
,,	d	17	12	14	
ENGLAND, N.W.	a	50	40	45	72
,,	b	21	32	27	
,,	c	17	12	14	
,,	d	12	16	14	
ENGLAND, S.W.	a	44	60	52	74
,,	b	20	24	22	
,,	c	16	8	12	
,,	d	20	8	14	
IRELAND, N.	a	40	52	46	74
,,	b	24	32	28	
,,	c	24	12	18	
,,	d	12	4	8	
IRELAND, S.	a	20	60	40	70
,,	b	36	24	30	
,,	c	16	12	14	
,,	d	28	4	16	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	42	52	47	84
,,	b	32	42	37	
,,	c	20	3	12	
,,	d	6	3	4	
SCOTLAND, E.	a	49	61	55	81
,,	b	29	23	26	
,,	c	19	10	15	
,,	d	3	6	4	
ENGLAND, N.E.	a	36	48	42	82
,,	b	48	32	40	
,,	c	13	10	12	
,,	d	3	10	6	
ENGLAND, E.	a	49	48	49	81
,,	b	35	29	32	
,,	c	13	10	11	
,,	d	3	13	8	
MIDLAND COS.	a	42	49	46	73
,,	b	23	32	27	
,,	c	29	13	21	
,,	d	6	6	6	
ENGLAND, S.	a	52	45	49	86
,,	b	32	42	37	
,,	c	10	13	11	
,,	d	6	0	3	
SCOTLAND, W.	a	16	45	31	58
,,	b	29	26	27	
,,	c	39	16	28	
,,	d	16	13	14	
ENGLAND, N.W.	a	39	39	39	65
,,	b	22	29	26	
,,	c	26	19	22	
,,	d	13	13	13	
ENGLAND, S.W.	a	32	61	47	76
,,	b	36	23	29	
,,	c	16	10	13	
,,	d	16	6	11	
IRELAND, N.	a	35	52	44	71
,,	b	23	32	27	
,,	c	29	13	21	
,,	d	13	3	8	
IRELAND, S.	a	29	52	41	73
,,	b	29	35	32	
,,	c	19	10	14	
,,	d	23	3	13	

SUMMARY.

BRITISH ISLES	a	40	56	48	79
,,	b	33	28	31	
,,	c	19	8	13	
,,	d	8	8	8	
BRITISH ISLES	a	38	50	44	75
,,	b	31	31	31	
,,	c	21	12	17	
,,	d	10	7	8	

Read—A memorandum from the Marine Superintendent reporting that since the last meeting seven logs had been received, six of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. P. Aldrich, R.N. Sub-Lieut. E. B. Kiddle, R.N.	H.M.S. "Egeria"	June 1—Sept. 30, 1888.	Surveying on Australian Station.	1888, p. 44.
Capt. E. Brown -	Barque "Moorhill."	April 26—Dec. 7, 1888.	Paysandu, Pernambuco, and home.	1887, p. 133.
Capt. G. A. Chaddock	Barque "Elissa"	Feb. 7—July 18, 1888.	Mauritius, Karachi, Rangoon, and homewards.	1888, p. 44.
Capt. T. K. Exham, F.R.A.S.	S.S. "Esk" -	Aug. 1—Nov. 30, 1888.	Trading between Demerara and West Indies.	1888, p. 44.
Capt. T. Leportier -	S.S. "Mira" -	July 15, 1888—June 1, 1889.	Calcutta and home, viâ Suez (2 voyages).	1888, p. 34.
Capt. W. Spratly -	S.S. "Mozart" -	March 1—Oct. 26, 1888.	Montevideo to Liverpool and back (2 voyages).	1888, p. 2.

Mr. Scott was instructed to present the Charts (O. 27) to Lieut. Kiddle, and to convey the best thanks of the Council to the other observers.

Submitted the following statements of work during December 1888:—

MARINE BRANCH.

January 8, 1889.

Examined 4 new logs.

Discussion of the two cyclones in the Arabian Sea in May and June 1885.

Discussion of Red Sea data contained in Admiralty logs.

Discussion of sea temperature, &c, in the vicinity of Cape Guardafui. Drawing an outline chart of the district for the lithographer.

Preparation and plotting of currents in all oceans from Office and Admiralty logs.

Drawing annual mean pressure and range charts over all oceans.

Supplying the Solicitor to the Board of Trade with particulars as to gales in the Atlantic, in reply to letter M.O. 2324.

Considering the diurnal range of barometric pressure in extra-tropical regions, and its bearing on the examination of logs.

Preparing pressure and sea temperature charts for insertion in the new issue of "Instructions for keeping a Meteorological Log."

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) DEPARTMENT

(To 31st December 1888.)

Monthly Weather Report:—

1887. Same as at date of last report of work done.

1888. Tables, rough maps, &c. for *November* prepared. Reports for other months same as at date of last report.

Weekly Weather Report.—All numbers issued promptly. Preparation of all Appendices kept well up to date.

Daily Weather Report.—Issued promptly; also monthly correction and addition sheet and summary of observations for *November*.

Inspections.—The Second Order Station at Prestwich and the Telegraphic Reporting Station at Barrow-in-Furness were inspected by Mr. Gaster, necessitating his absence from the Meteorological Office for three days.

Revision of Instructions in Meteorological Telegraphy.—In hand; about one third done.

Daily Telegrams from the United States.—Plotted almost to date.

Investigation into Prevalence of Fog over British Isles.—In progress, but not much advance made.

Checking of Daily Forecasts (3.30 p.m. and 8.30 p.m.).—Done to date.

Primary Checking of Storm Warnings recently issued.—Done to date.

Checking of Hay Harvest Forecasts, 1888.—Nearly completed.

The Christmas holidays have almost all been taken during this month.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

January 1st, 1889.

Observatory Returns.—The proofs of Part I. Hourly Readings for 1886 revised and signed for press. The velocity and other means for April 1886 checked, and Hourly Readings copied and sent to printer.

Harmonic Analyser.—Analysis of barograms for 1881 completed for two observatories. The Greenwich pressure coefficients for Chairman again altered in form, and additional tables prepared.

Miscellaneous.—An examination made of curves obtained from electrical anemometer, and work done towards the preparation of a new anemogram form. Diagrams drawn to illustrate tables of diurnal range in Mr. Bayard's tables. Diagrams of pressure coefficients for Greenwich drawn with General Strachey's developer. Experiments made with harmonic analyser in "summing and meaning" barometer readings. Sunshine cards from Bunhill Row to end of September tabulated for Royal Meteorological Society. Proof of new circular of Directions for using Sunshine Recorders revised and sent to press. In addition to the above several minor matters have engaged a good deal of time during the month.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

January 1st, 1889.

Examinations.

December 1886.—Completed.

January 1887.—Completed.

October and *November* 1888.—Partial examination of the Valencia work for the Registrar-General of Ireland.

Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

December 1886 and *January* 1887.—"*Notes of Errors*" to all observatories.

July—December 1886.—Report on the work from all observatories to Council.

Report on the thermometer corrections obtained at the annual inspections, 1885–88.

Miscellaneous.

Revising proof of "Diary of Operations, 1889."

The examination of candidates for two temporary clerkships consequent upon the contemplated transfer of Mr. Call to the Pantagraph Room, and the instructing of Messieurs S. A. Bristow and H. A. Hewitt, has occupied considerable time.

(Signed) T. E. ALLEN.

Reported—That the following cheques had been drawn during December 1888 :—

1888.			£	s.	d.
Dec.	1st.	J. S. Harding, jun., for payment of weekly salaries -	14	18	0
,,	5th.	Hon. R. Abercromby, inspections - - -	5	0	0
,,	8th.	J. S. Harding, jun., for payment of weekly salaries -	14	18	0
,,	11th.	J. A. Curtis, R.E. observations - - - -	10	10	0
,,	,,	,, inspections - - - -	2	13	4
,,	,,	F. Gaster, inspections - - - - -	5	12	3
,,	,,	Postmaster-General, telegrams - - - -	117	14	8
,,	12th.	Paris, M.O., telegrams - - - - -	*4	2	10
,,	15th.	J. S. Harding, jun., for payment of weekly salaries -	15	10	6
,,	19th.	W. H. Dines, bridled anemometer experiments - -	25	0	0
,,	,,	Capt. H. Toynbee, inspections - - - -	37	0	0
,,	22nd.	J. S. Harding, jun., for payment of weekly salaries -	15	10	6
,,	,,	J. A. Curtis, for payment of accounts for discussion of old observations - - - - -	7	1	0
,,	28th.	Pickford and Co., carriage of parcels - - -	2	9	3
,,	,,	W. F. Stanley, slide rule - - - -	4	10	0
,,	,,	Royal Meteorological Society, observations - -	54	6	9
		Carried forward - -	£336	17	1

* Paid by draft on a foreign banker.

		£	s.	d.	£	s.	d.
1888.	Brought forward -	-		-	336	17	1
Dec. 29th.	J. S. Harding, jun., for payment of weekly salaries			-	15	9	6
,, 31st.	Hamburg, M.O., synoptic charts -	-		-	37	10	0
,, ,,	R. H. Scott, Secretary - - -	-		-	66	13	4
,, ,,	J. S. Harding, jun. - } Office salaries	-		-	27	15	6
,, ,,	T. D. Bell - - }				16	5	0
,, ,,	Capt. H. Toynbee - - -	-		-	12	0	0
,, ,,	J. Sheerman, salary (harmonic analysis) -	-		-	11	5	0
,, ,,	J. E. Cullum, salary (Valencia Observatory)	-		-	19	3	4
,, ,,	R. H. Curtis -				22	18	4
,, ,,	J. A. Curtis - -				18	15	0
,, ,,	T. E. Allen - -				16	13	4
,, ,,	C. H. Thompson - } Salaries (discussion, &c. of				12	10	0
,, ,,	S. Call - - } observations).				12	1	8
,, ,,	R. G. Canham -				7	18	4
,, ,,	A. H. Bell - -				7	18	4
,, ,,	L. H. Powers -				4	11	8
,, ,,	F. Gaster - -				25	15	7
,, ,,	F. J. Brodie - -				18	15	0
,, ,,	G. G. Francis -				18	5	7
,, ,,	A. J. Rigby - - } Salaries (preparation, &c. of				17	16	3
,, ,,	R. Sargeant - - } Weather Reports).				12	13	1
,, ,,	A. R. Simpkins -				10	6	3
,, ,,	C. W. Heinemann -				5	8	4
,, ,,	Nav.-Lt. C. W. Baillie, R.N. - -				29	3	4
,, ,,	R. Strachan - -				27	15	6
,, ,,	C. Harding - - } Salaries (discussion, &c. of				22	18	4
,, ,,	H. Harries - - } observations, and care of				15	8	4
,, ,,	W. Allingham - } instruments).				15	8	4
,, ,,	W. G. James -				11	13	4
,, ,,	F. T. Bullen - -				9	3	4
,, ,,	R. F. Wallace -				9	3	4
,, ,,	G. J. Mayhew, rent - - -	-		-	158	15	0
,, ,,	J. S. Harding, senr., pension - -	-		-	10	14	1
,, ,,	H. Williams, care of bridled anemometer - - -	2	16	3			
,, ,,	,, care of Robinson's anemometer - - -	3	18	10			
					6	15	1
,, ,,	C. Niven, Aberdeen Observatory - -	67	8	0			
,, ,,	J. L. E. Dreyer, Armagh - - -	12	10	0			
,, ,,	W. L. Fox, Falmouth - - -	62	8	6			
,, ,,	Fleetwood Improvement Commissioners -	2	11	6			
,, ,,	R. Grant, Glasgow - - -	19	9	3			
,, ,,	Kew Committee, allowance - -	100	0	0			
,, ,,	W. Harrison, North Shields - -	2	19	9			
,, ,,	W. I. Fortescue, Orkney - - -	2	10	0			
,, ,,	S. J. Perry, Stonyhurst - - -	14	7	1			
,, ,,	J. O'Driscoll, Valencia (rent) - -	25	0	6			
,, ,,	J. E. Cullum, Valencia, expenses -	13	6	8			
					322	11	3
,, ,,	G. T. Watson, care of Yarmouth anemometer - - -	4	15	0			
,, ,,	,, meteorological reports* -	7	12	4			
					12	7	4
,, ,,	W. Boswell, Aberdeen - - -	5	12	0			
,, ,,	J. W. Mayes, Ardrossan* - -	3	3	0			
	Carried forward -	£8	15	0	1,407	2	1

* Bonus of 3*l.* 3*s.* allowed.

1888.			£	s.	d.	£	s.	d.
		Brought forward -	8	15	0	1,407	2	1
Dec. 31st.		M. J. Tolan, Belmullet* - - -	3	3	0			
,,	,,	H. Todd, Cambridge* - - -	8	0	10			
,,	,,	H. Mohn, Christiania - - -	5	10	0			
,,	,,	T. Macgowan, Donaghadee* - -	3	3	0			
,,	,,	P. Curnow, Dungeness* - - -	7	15	7			
,,	,,	J. Williams ,, - - -	2	12	0			
,,	,,	W. Brand, Dunrossness* - - -	7	1	5			
,,	,,	H. W. Bunce, Hawes Junction† - -	3	10	9			
,,	,,	S. Richards, Holyhead* - - -	7	1	6			
,,	,,	G. G. Appleton, Hurst Castle* - -	7	1	9			
,,	,,	J. Fisher, Jersey* - - -	7	3	6			
,,	,,	W. Hay, Leith* - - - -	3	3	0			
,,	,,	F. Gaster, London* - - -	7	1	0			
,,	,,	W. Berridge, Loughborough* - -	6	8	5			
,,	,,	Lloyd's, for Malin Head - - -	4	17	6			
,,	,,	K. Kerr, Mullaghmore* - - -	8	9	0			
,,	,,	A. Penny, Nairn* - - -	7	9	0			
,,	,,	J. W. Irvine, North Shields* - -	3	3	0			
,,	,,	W. Wickham, Oxford* - - -	6	16	6			
,,	,,	O. Boeddicker, Parsonstown - -	3	5	0			
,,	,,	W. Hewitt, Prawle Point* - -	6	8	0			
,,	,,	W. Kennedy, Roche's Point* - -	3	3	0			
,,	,,	S. Blake, St. Ann's Head* - -	6	9	6			
,,	,,	W. Thomas, Scilly* - - -	13	10	5			
,,	,,	J. H. Watson, Spurn Head - -	3	12	10			
,,	,,	J. Forbes, Stornoway - - -	8	15	7			
,,	,,	J. Sinclair, Wick* - - -	6	8	0			
,,	,,	F. Guy, York - - - -	3	18	0			
						173	16	1
,,	,,	P. Adie, instruments and repairs -	-		-	47	1	0
,,	,,	A. Buchan, salary - - -	-		-	37	10	0
,,	,,	J. R. Jones, Aberdeen agent - -	5	13	8			
,,	,,	L. Allen, Dundee ,, - -	1	5	7			
,,	,,	D. McGregor and Co., Glasgow agent -	9	4	0			
,,	,,	J. Gill, Liverpool agent - - -	23	18	11			
,,	,,	D. Forbes, Southampton agent - -	8	2	2			
						48	4	4
,,	,,	J. J. Friederichs, expenses connected with observations at Heligoland - - - -	-		-	1	12	0
,,	,,	F. Gaster, for payment of allowances for late evening and Sunday attendance - -	-		-	19	2	0
,,	,,	J. S. Harding, jun., petty cash - -	-		-	50	0	0
						£ 1,784	7	6

* Bonus of 3*l.* 3*s.* allowed. † Bonus of 1*l.* 11*s.* 6*d.* allowed (half rate).

63, *Victoria Street, January* 23, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. GALTON.
PROFESSOR DARWIN.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (January 9) were read and confirmed.

Read—Letter 142 from Mr. Cullum relating to the performance of the electrical anemometer on the roof of the observatory at Valencia, during the previous week, and a memorandum from Mr. R. Curtis (M.O. 171), as to the results of a comparison made by him between the performances of the two instruments when in close proximity to each other.

Mr. Scott was instructed to forward Mr. Curtis' memorandum to Mr. Cullum, with the remark that the Council did not consider he had paid sufficiently minute attention to the instrument when on the roof of the observatory. (P.C. 170.)

Read—The following letter (Minutes, p. 23) :—

Scottish Meteorological Society, 122, George Street,
SIR. Edinburgh, January 21, 1889.

AT a meeting of the Directors of Ben Nevis Observatory on Friday last it was intimated that a grant of 1,000*l.* had been made to the Directors from the surplus funds of the Edinburgh International Exhibition of 1886, and at the same meeting, plans of a low-level observatory at Fort William, by Mr. Sydney Mitchell, architect, were submitted.

It was therefore resolved to accept of the offer of the Meteorological Council, in their letter of March 22nd, 1888, to supply and erect in the observatory, at their cost, the self-registering instruments which were originally at Armagh, and otherwise complete the outfit of meteorological instruments for the observatory, and to make an annual grant of 250*l.* towards the maintenance of the observatory, and continue the grant of 100*l.* yearly towards the Ben Nevis Observatory under the existing arrangements, the Directors agreeing, on their part, to supply the Meteorological Office with copies of the observations made at both low and high-level observatories.

The Directors have requested Mr. Buchan to submit the plans of the observatory, which have been provisionally approved, to the Meteorological Council at their next meeting for any suggestions they may have to offer.

Yours faithfully,
(Signed) ARTHUR MITCHELL,
Hon. Secretary.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

Mr. Scott was instructed to inquire from Sir A. Mitchell as to the instruments required to complete the outfit of the proposed observatory. (P.C. 168.)

Submitted—Memoranda from Mr. J. Curtis, with specimens of the proposed modes of publication of—

I. The observations from Sanchez, Samanà Bay, S. Domingo (Minutes, p. 92).
II. The observations from the Royal Engineers and the Army Medical Department (Minutes, p. 72).

Both forms were approved.

Submitted—The following memorandum :—

WORK of the TELEGRAPHIC BRANCH, METEOROLOGICAL OFFICE.

SIR, Telegraph Room, January 23, 1889.

FOR several years past the routine work of this Branch has been increasing steadily, and the recent introduction of the enlarged maps for the Weekly Weather Report has brought a demand on our working power so considerable that I beg to submit, for the consideration of the Council, the following remarks :—

(1.) *Daily Weather Report.*—The charts have been enlarged; the number of reporting stations (for 8 a.m., 2 p.m., and 6 p.m.) has been largely increased; and much additional matter introduced, *e.g.*, the remarks on the "general situation at 8 a.m.," and the continental information given daily

on page 4.

(2.) *Weekly Weather Report*:—

1884. Report was enlarged to quarto size; maps were increased both in size and number; many new columns were added to the summary on the first page of each report, and the calculation of accumulated heat (for *districts only*) was commenced. A new (annual) appendix was added, making two in all. Number of stations reporting was 66.

1885. Two new columns were added to the table on fourth page of each report, giving *accumulated heat* for the week for each station. Number of stations was increased to 70.

1886. Six new columns were added to the summary on the first page of each report, giving for each district the difference between the *aggregate* values for accumulated heat, rainfall, and bright sunshine, and the averages for the corresponding periods in former years. A third appendix was added for each district, giving the mean aggregate values for rainfall and bright sunshine. Number of stations reporting was increased to 71.

1887. Two new columns were added to summary on first page of each report, giving the difference between the current weekly values for accumulated heat, and the averages for the corresponding values in former years. A fourth appendix was added, giving for each district the mean temperature of the air for each week in the year. Number of stations reporting was increased to 78.

1888. No additions.

1889. Charts greatly enlarged, and printed matter increased. Report now filling six quarto pages; four appendices. Number of stations reporting was 77.

All the appendices mentioned above are still in progress, the means being improved every year by incorporating with them the values for the current year.

(3.) *Monthly Weather Report.*—Commenced in January 1884; now more than a year behind date.

(4.) *Daily Weather Telegrams from the United States.*—Information plotted daily, and considered in connexion with our own daily weather charts.

(5.) *Checking of Storm Warnings.*—A second checking of the storm warnings issued has been added since the early part of 1887, and is presented to the Council at each of their meetings, so that all the warnings issued are now checked twice over.

(6.) *Checking of Daily Forecasts.*—I have received orders to check, in future, the 11 a.m. and 8.30 p.m. forecasts instead of those issued at 3.30 p.m. and 8.30 p.m. This doubles the work of checking, as those issued at 11 a.m. and those at 8.30 p.m. are for different periods.

I am also instructed to check in addition the 3.30 p.m. forecasts during the issue of hay harvest forecasts; and as this is already done from special information, the work will be done twice.

In addition to all the above, I have found it necessary to take my turn, in alternate weeks, with Mr. Brodie in the *preparation* of the 8 a.m. and 3.30 p.m. reports and forecasts, as the strain on him became too heavy, and it was desirable that the forecaster who issued the 8 p.m. forecasts should do the 8 a.m. and 3.30 p.m. work as well. Another alteration made recently is that when we are both in the Office, neither Mr. Brodie nor I take steps for the issue of warnings without consulting together as to what coasts shall be warned, &c. This is especially necessary in seasons like the present, when all the weather changes are of an undecided character.

The death of our telegraphist (Mr. Stevens) proved to be a more serious drawback to our work than was anticipated, because all the efforts made to teach others the work have been singularly unsuccessful.

In consequence of all the occurrences mentioned above, I find that it is (1) quite impossible to grapple with the Monthly Weather Report in its present form; (2) that the preparation of the Report on the prevalence of Fog over the British Islands is almost at a standstill; (3) that it will be impossible to do much more than keep pace with the current routine work, even when we have a full staff, and that during holiday times and in case of sickness we must have help, to insure promptitude in producing the Daily and Weekly Reports.

I beg therefore to make the following proposals:—

1. That the form of the Monthly Weather Report be changed; Sections I. and II. to be abolished, and the "General Remarks" in Section III. to be abbreviated.

2. That the plotting, &c. of the daily telegrams from the United States be discontinued. For the purposes of forecasting, this information is worse than useless; and as "records" the charts are inferior to the full reports which we receive by post from the United States later on.

3. That the preliminary checking of storm warnings submitted to the Council at each meeting be discontinued. This gives a most inaccurate view as to the success or otherwise of the warnings which have been issued.

4. That the amount of forecast checking be materially reduced.

5. That steps be taken to secure the services of a good telegraphist, who, when not engaged at the instrument, would assist in the general work of the room. He should be a neat writer, and, if possible, do a little freehand drawing, so as to draw weather maps if required.

The Council will remember that several years ago the late Chairman reported that the Branch was overweighted; it is now very much more so. A great improvement in my own health and some other advantages have, however, enabled us to keep pace with the bulk of the work till now.

I am, &c.
(Signed) FREDC. GASTER.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

Read—A memorandum from the Marine Superintendent reporting that since the last meeting 8 logs had been received, 6 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. A. Becket -	"Amana" -	May 18, 1887—Dec. 17, 1888.	Australia, San Francisco, Australia, and home.	1887, p. 19.
Capt. J. Dunbar -	S.S. "Arracan"	Sept. 22, 1888—Jan. 10, 1889.	Rangoon, Calcutta, and home, viâ Suez.	1888, p. 44.
Capt. F. W. Powles	S.S. "Essequibo"	Sept. 30—Dec. 25, 1888.	West Indies, Gulf of Mexico, and home.	1888, p. 45.
Capt. A. H. Sargent	Barque "Glenlora."	May 17—Dec. 27, 1888.	New Zealand and home	1888, p. 2.
Capt. A. Simpson -	S.S. "Australasian."	July 19, 1888—Jan. 7, 1889.	Australia, viâ Cape, and home, viâ Suez.	1888, p. 31.
Capt. S. Trott - Mr. T. C. Newton, F.R.Met. Soc., 1st Officer.	S.S. "Minia"	Sept. 1—Dec. 31, 1888.	On cable ground in North Atlantic, Halifax, and Newfoundland.	1888, p. 45.

Mr. Scott was instructed to present the Charts (O. 27) to Mr. Newton, and to convey the best thanks of the Council to the other observers.

Submitted the following:—

LIST of STORM WARNINGS issued to the COASTS of the BRITISH ISLANDS since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result, as to the character of the Warning.

1. WARNINGS ISSUED.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experieneed (if any), and Approximate Time of occurrence.	Result.* Character of Warning.
1889.				
Jan. 11th, 10.15 a.m. -	Ireland, S. - -	South cone	No increase of winds after issue of warnings.	C
„ „ -	„ E. - -	„	Moderate Sly. gale, evening of 11th	B
„ „ -	Scotland, E. -	„	Strong Sly. gale, night of 11th -	A
„ „ -	„ W.† -	„	Strong S.Ely. winds, night of 11th	B
„ 7 p.m. -	England, N.W. -	„	Neither gales nor strong winds -	C
„ „ -	„ S.E. -	„	„ „ „ -	C
„ „ -	„ E. -	„	Strong Ely. winds, morning of 12th	B
Jan. 14th, 7.20 p.m. -	Ireland, S. - -	South cone	Fresh Sly. gale, evening of 15th -	A
„ „ -	„ E. - -	„	Strong Sly. winds, on 15th -	B
„ „ -	Scotland, E. -	„	Fresh Sly. gale, night of 14th -	A
„ „ -	„ W.† -	„	Moderate Sly. gale, on 15th -	B
„ „ -	England, N.W. (I. of Man and Carlisle only).	„	Strong S.Ely. and Sly. winds, on 15th.	B

* A = complete success (*i.e.*, justified by gales of force 8 or more, by Beaufort's scale).
B = partial „ „ „ strong winds, forces 6 or 7 (Beaufort's scale).
C = failure (*i.e.*, not justified by either gales or strong winds).
† Information at present available for these coasts insufficient to give reliable results.

SUMMARY.

A + B - - - - -	9
C - - - - -	3

1. GALES EXPERIENCED FOR WHICH NO WARNINGS WERE ISSUED.

On the 18th January a brief but severe gale from the westward was experienced in Caithness and the Shetlands. It was apparently caused by a small disturbance, secondary to a larger depression which advanced over Lapland, and of which we could have no knowledge. The gale, though severe, was felt on the *extreme* northern coasts only.

(Signed) FREDC. GASTER.

Telegraphic Branch,
23rd January 1889.

Submitted—The following statement of accounts for the nine months ending 31st December 1888 :—

Income.	£ s. d.	£ s. d.
Balance from year 1887–88	- -	2,649 7 1
Proportion of vote for nine months - -	- -	11,475 0 0
Repayment of expenses charged under—		
Incidental expenses -	- -	9 19 4
Supply of Weather Information :		
D.W. Charts and Forecasts - -	206 1 6	
6 p.m. Charts -	18 15 0	
Information for Press Agencies, &c. -	71 8 2	
Telegrams - -	203 1 3	
		499 5 11
Sale of Instruments, &c. :		
Royal Navy account -	16 14 6	
Mercantile Marine account - -	15 10 10	
		32 5 4
Commission charged on work done for Colonies, &c. - -	- -	15 16 2
		£14,681 13 10

Expenditure.	£ s. d.	£ s. d.
Administration :		
Payment of Council -	750 0 0	
Secretary - -	600 0 0	
Salaries and wages -	599 7 6	
Rent, fuel, and lighting -	516 8 8	
Furniture and fittings -	87 16 2	
Incidental and contingent expenses -	256 9 5	
Pensions - -	92 2 3	
Expenses incidental to International Meteorological Congress	22 2 3	
		2,924 6 3
Special Researches -	- - -	426 15 11
Land Meteorology :		
Observatories and stations - -	1,464 10 9	
Discussion and reduction of observations -	991 3 6	
		2,455 14 3
Weather Information and Forecasts :		
Telegraphic reports and storm warnings -	2,042 8 11	
Preparation and issue of reports and forecasts - -	1,256 19 3	
		3,299 8 2
Inspections :		
Salaries and travelling -	- - -	664 15 1
Ocean Meteorology :		
Discussion and reduction of observations -	1,285 0 2	
Expenses incidental to the supply of instruments :		
Proportion for care and issue of instruments -	150 0 0	
Royal Navy -	438 6 5	
Mercantile Marine -	288 2 11	
Distant stations -	25 5 9	
		2,186 15 3
Balance - - -	- - -	2,723 18 11
		£14,681 13 10

Liabilities.	£ s. d.	Assets.	£ s. d.
To Council - - - -	750 0 0	By cash at Bank - - - -	2,943 8 1
„ outstanding accounts or work uncompleted - - -	442 14 8	„ „ at Office - - -	78 2 7
„ Post Office (estimated) - -	290 0 0	„ H.M. Exchequer - - -	975 0 0
„ sundry creditors - - -	131 6 11	„ sundry debtors - - -	341 9 10
„ balance - - - -	2,723 18 11		
	£4,338 0 6		£4,338 0 6

63, *Victoria Street, February* 6, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (January 23) were read and confirmed.

Read—Letter 193 from the Post Office enclosing a form of agreement for the private wires between Valencia Observatory and Kilbeg Hill (Minutes, p. 90).

Mr. Scott was instructed to sign the agreement and forward it (P.C. 270).

Read—Letters 196, 222, and 230 from Mr. Cullum, relative to the performance of the electrical anemometer at Valencia, and also memoranda by Mr. Curtis thereupon.

Mr. Scott was instructed to direct Mr. Cullum to continue the comparisons for a time longer (P.C. 201).

The Memorandum as to the work of the Telegraphic Branch (Minutes, p. 98) was taken into consideration.

It was proposed for the future—

(1.) That the only forecasts to be checked in the Office should be those issued at 8.30 p.m., which appear in the morning newspapers. The Hay Harvest forecasts, when issued, to be checked by the reports from the recipients of the messages. That a larger number of stations be included in the list of those by the reports from which the storm warnings are checked, and that the necessary returns from the lighthouses be asked for with this object.

(2.) That the plotting of the information received *viâ* Paris, from America, be discontinued.

(3.) That Mr. Scott inquire and report as to the engagement of a telegraphist.

(4.) That as to the Monthly Weather Report—

(*a.*) The report for the eight unfinished months of 1887 be completed in an abridged form.

(*b.*) The report for 1888 be discontinued as a separate publication, but the calendar monthly tables and maps be issued (with brief introductory remarks), as a supplement to the Weekly Weather Report for the year 1888. The maps to be lithographed.

(*c.*) The same principle be applied to the volume of the Weekly Weather Report for 1889, the tables for which shall be issued with regularity as early after the end of each month as practicable.

(*d.*) The lithographed table of monthly mean values issued with the Daily Weather Report be discontinued, inasmuch as this table will already appear in print; (*vide b.*) copies of this printed table to be issued to subscribers to the Daily Weather Reports, if required.

Reported—That the following instruments had been ordered for stock:

Admiralty List.

Six pocket aneroids, cost, including verification, 27*l.*

Observatory List.

One Beckley's rain-gauge, with lifter, cost 31*l.*

(Signed) R. STRACHAN.

Feb. 6, 1889.

R. H. Scott, Esq., F.R.S.

Read—A memorandum from the Marine Superintendent reporting that since the last meeting 9 logs had been received, 6 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. R. Belding -	Barque "Atlantic"	May 28, 1888—Jan. 30, 1889.	Rosario, Port Nolloth, and home.	—
Capt. E. T. Chaddock	Barque "Elvira"	Feb. 1, 1888—Jan. 11, 1889.	Altata (Mexico) and home	—
Staff. Comr. E. S. Clapp, R.N. and H. K. Sturdee, chief officer.	Sch. "Richmond"	Sept. 3—Dec. 31, 1888.	Cruizing among Bahamas	1888, p. 67.
Capt. R. W. Haselwood and H. S. Blackburne, chief officer.	S.S. "Rohilla"	Nov. 9, 1888—Jan. 30, 1889.	India and home, viâ Suez	1888, p. 44. 1887, p. 85.
Capt. C. J. Russell -	"Belfast" -	May 22, 1888—Jan. 16, 1889.	Calcutta and home -	1888, p. 10.
Capt. H. Trunks -	Barque "Aldborough."	Oct. 27, 1887—Dec. 22, 1888.	Australia, San Francisco, and home.	1887, p. 49.

Mr. Scott was instructed to present the Charts (O. 27) to Captains Belding and Chaddock, and to convey the best thanks of the Council to the other observers.

Submitted—The following statement of work during January 1889:—

MARINE BRANCH.

February 5, 1889.

Examined 20 new logs.

Discussion of the cyclones in the Arabian Sea in May and June 1885. The daily charts for the whole period of six weeks have been reduced by eidograph and are in course of preparation for the lithographer.

Discussion of Red Sea data contained in logs supplied by the Admiralty.

Charting observations from Office and Admiralty logs in the neighbourhood of Cape Guardafui.

Preparing and plotting currents in Office and Admiralty logs for all oceans.

Indexing data in ocean 10-degree squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

PANTAGRAPH ROOM.

January 31, 1889.

Observatory Returns.—Proof of Hourly Readings for part of April 1886 revised and signed for press. The daily and other means, and the hourly vapour tension values, calculated for May and June 1886, and the hourly values copied and sent to printer.

Harmonic Analyser.—The analysis of barograms for 1881 done for about six months of Glasgow. Some special work was done for selected 5-day periods for both pressure and temperature for the ten years 1871–80.

Quarterly Weather Report.—Proof of part IV., 1879, read and revised, and letter-press and plates are signed for press; the part is being still delayed for the plates to accompany the Appendix.

Miscellaneous.—New anemogram form prepared for the electrical anemograph. Comparison made of the result obtained from the electrical anemometer with those yielded by the ordinary instrument at Valencia. The new Sunshine Recorder Instructions, and cloud measurements, as well as the dating, &c. of sunshine cards for December, have occupied some time.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

February 1, 1889.

Examinations.

February, March, April 1887.—Completed.

December 1888.—Partial examination of the Valencia work for the Register-General of Ireland.

Weekly examination (on receipt) of curves and documents from all stations.
Aberdeen rainfall, 1888.—The rain curves for the year.

Reports, &c.

February to April 1887.—"Notes of Errors" to all observatories, and monthly report thereon.

Miscellaneous.

Both Mr. Call and myself have been occupied in instructing Messrs. Bristow and Hewitt; Mr. Call was transferred from this room on the 5th January.

(Signed) T. E. ALLEN.

Submitted the following—

LIST of STORM WARNINGS issued to the COASTS of the BRITISH ISLANDS since the last Meeting of the Meteorological Council, naming the Day and Hour of Issue, the Coasts warned, the Signals hoisted, the Gales experienced (with the approximate time of their occurrence), and the Result, as to the Character of the Warning.

1. WARNINGS ISSUED.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and Approximate Time of occurrence.	Result.* Character of Warning.
1889.				
Jan. 27th, 7.10 p.m.	Scotland, E.	North cone	Neither gales nor strong winds	C
,, ,,	,, W.	,,	,, ,, ,,	C
Jan. 28th, 7.20 p.m.	Ireland, S.	South cone	Fresh Sly. and S.Wly. gales, night of 28th.	A
,, ,,	,, E.	,,	,, ,, ,,	A
,, ,,	Scotland, W.	,,	Fresh S.Wly. gale, night of 29th	A
,, ,,	England, N.W.	,,	Fresh S.Wly. to N.Wly. gale, on 29th.	A
			Fresh S.Wly. gale, on 30th	A
,, ,,	,, W.	,,	Fresh S.Wly. gale, on 29th	A
Feb. 2nd, 7.10 p.m.	Scotland, E. (except Dunrossness and Wick).	North cone	Strong N.Wly. gale, on 3rd	A
,, ,,	England, S.W.†	,,	Gale already blowing on part of coast, but moderate N.Wly. gales felt subsequently in Channel Islands.	?
,, ,,	,, S.	,,	Fresh Nly. gale on night of 3rd	A
,, ,,	,, S.E.	,,	,, ,, ,,	A
,, ,,	,, E.	,,	Fresh Nly. to N.Ely. gales on 3rd and 4th.	A
Feb. 4th, 8 p.m.	Scotland, E. (northern part).	North cone	Fresh N.Wly. gale on 5th	A
,, ,,	,, W.†	,,	Strong N.Wly. winds, night of 5th	B

* A = complete success (*i.e.* justified by gales of force 8 or more by Beaufort's scale).
B = partial ,, (,, strong winds, force 6 or 7 ,,).
C = failure (*i.e.* not justified by either gales or strong winds).
† Information at present available for these coasts insufficient to give reliable results.

SUMMARY.

A + B - - - - = 11
C - - - - = 2

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNING WAS ISSUED.

A severe N.Wly. and Wly. gale was felt on our western, extreme northern, and part of our south-western coasts on February 2nd and 3rd. For this no warning was issued. At 6 p.m., on February 1st, it was known that a large depression was lying near the Shetlands. The barometer had begun to rise in Ireland, and it appeared as though the disturbance would pass off without anything more than a moderate gale being experienced on our coasts. In the following night, however, the depression became much deeper, and at 8 a.m. next day the gale was already blowing in the districts named. It was then too late to issue warnings.

FREDC. GASTER.

Telegraphic Branch,
6th February 1889.

Submitted—The following report on the 8.30 p.m. forecasts for January 1889:—

The letters used have the following signification:—

a=complete success.
b=partial (*i.e.* more than half) success.
c=partial failure.
d=total failure.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	39	49	44	81
"	b	42	32	37	
"	c	10	13	12	
"	d	9	6	7	
Scotland, E.	a	52	49	51	82
"	b	23	39	31	
"	c	9	6	7	
"	d	16	6	11	
England, N.E.	a	52	55	54	80
"	b	26	26	26	
"	c	9	13	11	
"	d	13	6	9	
England, E.	a	61	45	53	86
"	b	23	42	33	
"	c	6	10	8	
"	d	10	3	6	
Midland Counties	a	61	42	52	80
" "	b	20	36	28	
" "	c	6	19	12	
" "	d	13	3	8	
England, S.	a	58	39	49	83
"	b	26	42	34	
"	c	10	16	13	
"	d	6	3	4	
Scotland, W.	a	36	36	36	76
"	b	35	45	40	
"	c	19	6	13	
"	d	10	13	11	
England, N.W.	a	45	32	39	81
"	b	36	49	42	
"	c	6	13	10	
"	d	13	6	9	
England, S.W.	a	55	52	54	87
"	b	32	35	33	
"	c	3	13	8	
"	d	10	0	5	
Ireland, N.	a	35	52	44	76
"	b	39	26	32	
"	c	13	22	18	
"	d	13	0	6	
Ireland, S.	a	50	39	45	73
"	b	20	36	28	
"	c	20	19	19	
"	d	10	6	8	

Summary.

British Isles	a	50	44	47	80
"	b	29	37	33	
"	c	10	14	12	
"	d	11	5	8	

Reported—That the following cheques had been drawn during the month of January:—

1889.			£	s.	d.
Jan.	5th.	J. S. Harding, jun., for payment of weekly salaries	16	0	6
„	9th.	G. A. Gillett, wood, oil, &c.	4	0	9
„	„	T. Galvin, water-pipes and repairs at Valencia	58	6	9
„	„	Kew Committee, verifications	14	11	0
„	„	Negretti and Zambra, instruments and repairs	41	14	9
„	12th.	J. S. Harding, jun., for payment of weekly salaries	16	0	6
„	14th.	Paris M.O., telegrams	*4	5	5
„	18th.	T. De La Rue and Co., sunshine cards	23	8	9
„	„	H. Bond, office repairs	7	11	5
„	19th.	J. S. Harding, jun., for payment of weekly salaries	16	0	6
„	„	H.M. Postmaster-General, private wire, Kilbeg Hill, Valencia	36	0	0
„	26th.	Gas Light and Coke Co., gas rate, due Christmas	7	11	0
„	„	E. Higgs, office repairs	6	1	0
„	„	Williams and Norgate, books	6	15	9
„	„	Wightman & Co., printing and wrappers	9	16	0
„	„	Postmaster General, telegrams	209	8	0
„	„	J. S. Harding, jun., for payment of weekly salaries	16	0	6
„	31st.	R. H. Scott, Secretary	66	13	4
„	„	J. S. Harding, jun. — Office salaries	27	15	6
„	„	T. D. Bell — Office salaries	16	5	0
„	„	Captain H. Toynbee, pension	12	0	0
„	„	J. Sheerman, salary (harmonic analyser)	11	5	0
„	„	J. E. Cullum „ (Valencia Observatory)	19	3	4
„	„	R. H. Curtis — Salaries (discussion, &c. of observations).	22	18	4
„	„	J. A. Curtis — Salaries (discussion, &c. of observations).	18	15	0
„	„	T. E. Allen — Salaries (discussion, &c. of observations).	16	13	4
„	„	C. H. Thompson — Salaries (discussion, &c. of observations).	12	10	0
„	„	S. Call — Salaries (discussion, &c. of observations).	12	1	8
„	„	R. G. Canham — Salaries (discussion, &c. of observations).	7	18	4
„	„	A. H. Bell — Salaries (discussion, &c. of observations).	7	18	4
„	„	L. H. Powers — Salaries (discussion, &c. of observations).	4	11	8
„	„	F. Gaster — Salaries (preparation, &c. of Weather Reports).	25	15	7
„	„	F. J. Brodie — Salaries (preparation, &c. of Weather Reports).	18	15	0
„	„	G. G. Francis — Salaries (preparation, &c. of Weather Reports).	18	5	7
„	„	A. J. Rigby — Salaries (preparation, &c. of Weather Reports).	17	16	3
„	„	R. Sargeant — Salaries (preparation, &c. of Weather Reports).	12	13	1
„	„	A. R. Simpkins — Salaries (preparation, &c. of Weather Reports).	10	6	3
„	„	C. W. Heinemann — Salaries (preparation, &c. of Weather Reports).	5	8	4
„	„	Nav. Lieut. C. W. Baillie, R.N. — Salaries (discussion, &c. of observations and care of instruments).	29	3	4
„	„	R. Strachan — Salaries (discussion, &c. of observations and care of instruments).	27	15	6
„	„	C. Harding — Salaries (discussion, &c. of observations and care of instruments).	22	18	4
„	„	H. Harries — Salaries (discussion, &c. of observations and care of instruments).	15	8	4
„	„	W. Allingham — Salaries (discussion, &c. of observations and care of instruments).	15	8	4
„	„	W. G. James — Salaries (discussion, &c. of observations and care of instruments).	11	13	4
„	„	F. T. Bullen — Salaries (discussion, &c. of observations and care of instruments).	9	3	4
„	„	R. F. Wallace — Salaries (discussion, &c. of observations and care of instruments).	9	3	4
„	„	Kew Committee, photographic paper	6	7	0
„	„	J. E. Cullum, expenses for January	11	16	2
„	„	F. Gaster, for payment of allowances for extra attendance	16	12	7
„	„	J. S. Harding, jun., petty cash	50	0	0
			£1,084	11	1

* Paid by draft on a foreign banker.

63, *Victoria Street, February* 20, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN.	MR. GALTON.
PROFESSOR DARWIN.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (February 6) were read and confirmed.

The action as to the work of the Telegraph Room, proposed at last meeting, was approved.

It was resolved that in future the results of each individual storm warning be not printed on the Minutes, but that the numerical summary of the results be printed, with the notes of all gales for which no warnings had been issued.

Mr. Scott stated that he had found that Mr. F. W. Snell, of the Telegraph Department, G.P.O., was willing to accept the post of telegraphist at a salary of 80*l.*, rising by 5*l.* annually to 110*l.* (Minutes, 1884, p. 119), as contemplated in the memorandum (Minutes, January 23) (Lr. M.O. 332).

He was authorised to engage Mr. Snell.

It was further resolved that a report be prepared on the possibility of tabulating the anemograms so as to obtain records of squalls and gusts of short duration.

MEMORANDUM.

Re the Work of the Land Room.

Meteorological Office, February 20, 1889.

FOR a long time past the Office has been regularly receiving from a large number of Stations of the Second Order monthly returns, which, having been entered and acknowledged, have been put away till required for use. For many years the preparation of the volumes of the "Hourly Readings," together with the computation of the mean results from the records of the seven observatories, left no time for anything in the shape of supervision of these stations, more than was absolutely necessary, and the publication of the returns (which began with back years) has never yet been up to date.

Since the transference of most of the observatory work to the Pantagraph Room, considerable progress has been made with the arrears of publication, and now I am engaged upon the volume of "Returns from Stations of the Second Order" for 1885, which I expect to complete for press by the end of April, that for 1884 having been issued in November last year. It must, however, be some time before this publication is quite up to date; and meanwhile, month by month, sheets are being received and stored without any sufficient examination, and thus any errors in the methods employed, or in the instruments in use, being undetected, are continually repeated, and the record in consequence is vitiated to that extent.

I beg therefore to submit, for the consideration of the Council, whether it will not be better for me to make an earnest attempt to completely examine and check, *upon receipt*, all the returns received from home, foreign, and colonial stations from the beginning of the present year.

This will mean, firstly, an increase in the work of the room, which will have to be provided for to the extent of at least one additional unclassified clerk; and, secondly, some delay in the issue of the "Returns from Stations of the Second Order" for the years 1886, 1887, and 1888.

The number of returns received each month may be stated as follows:—

From British and Irish stations, on Form 19, full monthly returns, but some not yet complete	42
„ British and Irish stations, on smaller forms, including fishery diagrams, &c.	21
„ Foreign and colonial stations, mostly on Form 19	19
Total number of returns	82

The *sort* of work required to be done may be seen from the sheets received from a new station, San Antonio, Teneriffe; and the accompanying sheets received from Papho (Cyprus) will illustrate the *need* of such supervision.

J. A. C.

R. H. Scott, Esq.

Submitted—The following Statement respecting the Records received from the Sel recording Observatories (see Minutes, 21st December 1868, 20th November 1876, and 3 January 1883) :—

JANUARY—JUNE 1887.	ABERDEEN.		ARMAGH.		FALMOUTH.		KEW.		VALENCIA.	
ANEMOGRAPH :—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocit
Action of Instrument	Good.	Good.	Good.	Fair.	Good.	Good.	Good.	Good.	Good.	Good
Records deficient :—										
Due to stoppage of clock	0	0	24 hrs.	25 hrs.	0	0	0	0	4 hrs.	5 hrs.
„ other causes	0	0	0	0	2 hrs.	2 hrs.	0	149 hrs.	0	0
Number of errors discovered :—										
By general examination	6	3	31	21	1	6	2	2	2	1
Results of 40 *re-measurements :—*										
Greatest difference	1·0	2·0	1·0	2·0	1·0	2·0	1·0	2·0	1·0	2·0
Mean difference irrespective of sign	0·1	0·7	0·1	0·8	0·1	0·7	0·1	0·6	0·1	0·6
Residual difference (— Meteorological Office)	0·0	0·0	0·0	+0·1	−0·1	0·0	0·0	0·0	0·0	+0·1
Orientation verified	Monthly.	—	Monthly.	—	Monthly.	—	Monthly.	—	Monthly.	—
RAIN GAUGE :—										
Action of Instrument	Fair to Good.		Good.		Indifferent.		Good.		Indifferent.	
Records deficient :—										
Due to stoppage of clock	45 hrs.		0		0		0		0	
„ other causes	9 hrs.		0		0		0		0	
Number of errors discovered :—										
By general examination	9		4		10		1		14	

——	ABERDEEN.	FALMOUTH.	KEW.	VALENCIA.
BAROGRAPH :—				
Action of Instrument	Good.	Good.	Good.	Good.
Character of Photography	Do.	Do.	Do.	Fair.
Records deficient :—				
Due to stoppage of clock	0	0	0	0
„ failure of light	28 hrs.	0	0	0
„ other causes	216 hrs.	0	0	26 hrs.
Number of errors discovered				
In entry of standards	*2	14	4	0
„ calculating residuals	0	15	0	2
„ applying „	0	5	0	2
By general examination	0	17	2	37
Results of 40 *re-measurements :—*				
Greatest difference	·009	·008	·009	·011
Mean difference irrespective of sign	·003	·002	·003	·003
Residual difference (— Meteorological Office)	— ·001	·000	·000	—·001
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	·001	·002	·002	·002

	ABERDEEN.		FALMOUTH.		KEW.		VALENCIA.	
THERMOGRAPH :—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Do.		Do.		Fair.	
Records deficient :—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	3 hrs.	3 hrs.	0	0
„ failure of light	0	0	0	0	0	0	1 hr.	0
„ imperfectly moistened bulbs	—	11 hrs.	—	3 hrs.	—	38 hrs.	—	8 hrs.
„ partially frozen bulbs	—	95 hrs.	—	39 hrs.	—	176 hrs.	—	0
„ other causes	159 hrs.	121 hrs.	0	0	2 hrs.	2 hrs.	1 hr.	1 hr.
Number of errors discovered :—								
In entry of standards	2	3	5	5	0	2	7	2
„ maxima and minima	2	—	11	—	5	—	7	—
By general examination	17	27	3	4	2	6	19	19
Results of 40 *re-measurements :—*								
Greatest difference	0·4	0·3	0·3	0·3	0·3	0·2	0·4	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·2	0·1	0·1
Residual difference (- Meteorological Office)	−0·1	0·0	0·0	0·0	0·0	0·0	0·0	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·2	0·2	0·2	0·1	0·1	0·1	0·2	0·1

* See *Aberdeen* note. The results of two months only.

Aberdeen.—During the first three months the work suffered considerably owing to the enforced absence of Mr. Boswell through illness; the photography especially was very bad, hence the great loss of barograph and thermograph records "due to other causes." The loss of record owing to the wet bulb being partially frozen, might be reduced if a little more attention were paid to the state of the bulbs at the time of reading the standards. The results of the barograph re-measurements are for two months only, the standards having had to be rejected during the first four months in consequence of the slipping of the thermometer attached to the standard barometer, and the consequent doubt as to the correction for temperature. Attention had been repeatedly called to the disagreement between the readings of the standard and the barograph, but without result.

Armagh.—The velocity traces are very intermittent at low velocities, owing to a slight mechanical defect.

Falmouth.—Throughout the period both the direction and velocity traces are ten minutes late, the pricker having become bent. The observer, to whom the fact was known, neither called attention to the defect or allowed for it when tabulating The action of the Beckley gauge was not at all satisfactory, and the traces indicate a considerable amount of bagging.

Kew.—The losses of anemograph and thermograph traces through frost are largest at this observatory. A little more attention to the wet bulb when reading the standards would give more favourable results.

Valencia.—The photography at this observatory is not so good as could be wished, even after making due allowance for the absence of gas. The work generally indicates a lower standard of care than at the other observatories.

(Signed) T. E. Allen.

Read—A memorandum from the Marine Superintendent reporting that since the last meeting eight logs had been received, six of them being "excellent."

No. of Log.	Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
7403	Capt. E. Bourke, R.N.	H.M.S. "Hyacinth."	April 1—Dec. 16, 1888.	Arica to Coquimbo, Sandwich Islands, and various islands in South Pacific.	1888, p. 24.
7406	Capt. W. G. North	S.S. "Tiger" -	Sept. 29, 1888—June 30, 1889.	Trading between Hull and Hamburg.	1888, p. 45.
7425	Capt. Alex. Crighton.	S.S. "Circe" -	June 10, 1887—Oct. 26, 1888.	Quebec and home (five voyages.	1887, p. 32.
7426	Capt. S. Griff Jones	Bq. "Hermine"	Feb. 3, 1888—Jan. 28, 1889.	Ports on west coast of South America and home.	1886, p. 14.
7427	Capt. F. West -	S.S. "Port Adelaide."	Feb. 25, 1888—Feb. 12, 1889.	Ports in China, Japan, United States, and home.	1886, p. 126.
7428	Capt. H. Bright -	Bq. "Beltana" -	Feb. 24, 1888—Feb. 14, 1889.	Adelaide, Tahiti, Adelaide and home.	1887, p. 123.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Submitted—The following summary as a result of the primary checking of the storm warnings issued to the coasts of the British Islands since the last meeting of the Council. In this—

A = complete success (*i.e.*, justified by gales of force 8 or more by Beaufort's scale).

B = partial success (*i.e.*, justified by strong winds, forces 6 or 7 (Beaufort's scale)).

C = failure (*i.e.*, not justified by either gales or strong winds).

1. Warnings Issued.

Summary.

A + B - - - - -	36
C - - - - - -	11

The above values are liable to modification as they are based on information which, for some parts of our coasts, is incomplete.

2. Gales experienced for which no Warnings were Issued.

None.

(Signed) Fredc. Gaster.

Telegraphic Branch,
20th February 1889.

Mr. Baillie submitted the charts of the Aden cyclone (Minutes, 1886, p. 131) from May 15 to June 25, 1885.

These were approved and ordered to be printed.

Mr. Galton was appointed auditor for the year 1889.

63, *Victoria Street, March* 6, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (February 20) were read and confirmed.

Read—The following Letter:—

(M.O. 345.)

SIR, Treasury Chambers, February 20, 1889.

WITH reference to your letter of the 12th December last covering an estimate of the expenses of your Department for the year 1889–90, I am directed by the Lords Commissioners of Her Majesty's Treasury to request you to inform the Meteorological Council that they have caused the following note to be inserted after the provision for your Department in the forthcoming estimates in lieu of the present explanations:—

"Estimated appropriation of the grant 1889–90.

	£
Administration and inspection	3,160
Special researches and experiments	1,000
Land meteorology	3,420
Weather information forecasts, including 900*l.* paid to the Post Office for Inland Telegrams	3,900
Ocean meteorology	2,410
General charges	1,410
	£15,300"

I am, &c.
(Signed) W. JACKSON.

The Secretary, Meteorological Council.

Mr. Scott reported that at the request of the Controller of the Stationery Office, he had forwarded to that gentleman a copy of the letter from the Board of Trade (Minutes, 1867 p. 13), (M.O. 136/67), authorising the Office to obtain Stationery, &c., from that Office.

With reference to the remuneration of the Council it was resolved that—

After the end of the present official year the sum assigned for the remuneration of the Council will be appropriated as follows:—

	£
For the Chairman	300
For the four members of Council (excluding the Hydrographer) at 50*l.*	200
Attendance fee for 94 meetings (estimated at 4*l.*)	375
Travelling allowances:—	
From Edinburgh, 7*l.* 10*s.*, 10 journeys	125
From Oxford and Cambridge, 1*l.* 5*s.*, 40 journeys	
	£1,000

Income tax will be payable (deducted by Office) on the above, excluding the travelling allowance.

If the aggregate amount payable on the above scale (before deduction of income tax) should be in excess of the total sum authorised, 1,000*l.*, a rateable reduction will be made from the payments under attendance fees, which, however, will not be increased if the aggregate is less than 1,000*l.*

It was resolved in connection with the memorandum on the condition of the Land Meteorological Department (Minutes, p. 107), that the employment of extra hands to bring up the examination of Schedules as received and to clear off arrears of records be approved. Mr. Scott to submit a scheme at next meeting.

Read—Letters Nos. 367 and 410 from Mr. Cullum, relative to the working of the electrical anemometer at Valencia (Minutes, p. 102), and applying for batteries, and Mr. Scott was instructed to ascertain the cost of the batteries.

Read—The following Letter :—

(M.O. 440.)

Kew Observatory, Richmond, Surrey,
March 5, 1889.

DEAR MR. SCOTT,

I BEG to hand you herewith a report on the reduction of the cloud pictures taken at this Observatory in 1887, by my graphic process. Accompanying the report are the following :—

1. Note book, containing prints of the negatives with measurements and results.
2. Copies of tables of results.
3. Duplicate prints of pictures of June 22.
4. Set of photographs of the cloud measuring apparatus.

I would beg to call attention to the fact that the apparatus is all home made, and that consequently its cost to the Meteorological Council has been insignificant, but at the same time it is not capable of a high degree of accuracy, although probably good enough for the work assigned to it.

I am, &c.

R. H. Scott, Esq., F.R.S. (Signed) G. M. WHIPPLE.

General Strachey was requested to examine the paper.

Read—Letter 442 from Capt. Toynbee accompanying a discussion of the Atlantic Charts which he had carried out for September 1882, and also a memorandum by Capt. Wharton in which he recommended that the discussion should not be carried on further on the same lines, and that the tracks should be only laid down when the area of depression was clearly defined.

Read—A memorandum from the Marine Superintendent reporting that since the last meeting 12 logs had been received, 10 of them being "excellent."

No.	Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
7430	Capt. J. W. King	"Philomene"	Nov. 22, 1887—Feb. 17, 1889.	Mauritius Adelaide, Valparaiso, and home.	1887, p. 48.
7432	Capt. W. Ellery	"Holkar"	June 12, 1888—Feb. 14 1889.	Calcutta and home	1888, p. 24.
7436	Capt. R. Peebles	Barque "Bracadale."	May 30, 1888—Feb 14, 1889.	Do. do.	1888, p. 18.
7437	Capt. G. W. Read, F.R.G.S. / W. H. Richardson	S.S. "Auretta"	Dec. 2, 1888—Feb. 19, 1889.	Genoa, Odessa, and home	1888, p. 45.
7439	Capt. G. Janes	"Middlesex"	May 14, 1888—Feb. 23, 1889.	Singapore, Chittagong, and home.	1888, p. 2.
7440	Capt. R. Woolward	S.S. "Nile"	Oct. 19, 1888—Feb. 17, 1889.	West Indies, Gulf of Mexico, and home (2 voyages).	1888, p. 45.
7442	Capt. A. Hart Dyke	S.S. "La Plata"	Dec. 6, 1888—Feb. 7, 1889.	River Plate and home	1888, p. 79.
7443	Capt L. A. Munn	S.S. "Durban"	Nov. 2, 1888—Feb. 19, 1889.	Cape ports and home	—
7445	Lieut. A. M. Field, R.N.	H.M.S. "Dart"	Sept. 1—Dec. 31, 1888.	Surveying on Australian station.	1888, p. 80.
7446	Capt. G. A. Chaddock.	Barque "Elissa"	July 18, 1888—Feb. 19, 1889.	South Indian Ocean, Boston (U.S.), Cadiz, and home.	1888, p. 90.

Mr. Scott was instructed to present the Charts (O. 27) to Captain Munn, and to convey the best thanks of the Council to the other observers.

Submitted.—The following Summary, as a result of the primary checking of the Storm Warnings issued to the coasts of the British Islands, since the last meeting of the Council. (For explanation see Minutes p. 109.)

1. WARNINGS ISSUED.

SUMMARY.

A + B successful - - - - = 0
C failures - - - - - = 3

2. GALES EXPERIENCED, FOR WHICH NO WARNING WAS ISSUED.

None.

(Signed) FREDC. GASTER.

Telegraphic Branch,
6th March 1889.

Mr. Scott submitted the following Code of Regulations which was ordered to be inserted on the Minutes :—

CODE of REGULATIONS, &c., &c., for CONDUCTING the WORK at the FIRST-CLASS OBSERVATORIES, and the EXAMINATION thereof, 1889.

The errors to which the traces derived from self-recording meteorological instruments, and the numerical values obtained from them, are subject, are of three classes, viz. :—

i. Errors in the traces themselves, including those due to faulty attachment of the paper upon which the curves are produced.
ii. Errors of date and timescale entered upon the papers.
iii. Errors in tabulating from the traces.

Errors in the Traces themselves.

With a view of avoiding as much as possible errors included in the first category, the attention of observers in charge of instruments is directed to the following points :—

Care must be taken that the gas flames in the instruments are so adjusted, and the condensers and reflectors so fixed, that the barometer tube and two thermometer tubes with their attached shields are at all times well illuminated.

In the event of a very exceptional rise or fall of pressure or temperature, and when the observer has reason to fear that readings will otherwise be lost, the instrument should be temporarily raised or lowered by means of the screw, so that the record of extreme values may be secured.

But as any alteration of the positions of the instruments, especially of the barometer, throws out the zero of the scales, this measure should only be adopted with extreme caution.

In all cases when changes in the positions of the instruments are made careful eye observations should be made before and after each change to guard the records from the effects of erroneous index errors, or errors of zero lines.

In the case of the barometer the instrument should be carefully restored to its original position as soon as the occasion for the change has passed away.

The thermometers, however, must be regularly raised and lowered by the screw suspending them in the course of every year, in order to secure sufficient illumination for the portion of the scale likely to be in use in summer and winter respectively: and care must be taken not to postpone this operation in spring and autumn until some of the readings have been lost.

Great care should be taken that all the parts of the instruments are working correctly, and are free from dust.

Before wrapping the photographic paper round the cylinders it should be carefully examined as to the freedom from blemishes or defective coating of the sensitive surface, and when fixed in its place on the cylinder a second examination should be made to see that while it is everywhere in close contact with the cylinder there is no bagging or bulging, and that its edge is parallel to the edge of the cylinder nearest to the trace. Care should also be taken in cutting the superfluous paper off, that no loose ends are left projecting, as they are liable to cause a stoppage of the clock.

The prepared papers for use with the anemograph and rain gauge require similar precautions to be taken with regard to wrapping them upon the cylinders; but additional care is also required, so that the lines ruled upon these papers are made to coincide with certain points of the apparatus designed for the purpose of properly setting the instruments.

After placing a new sheet of prepared paper on the cylinder of the rain gauge, the glass tabulating scale should be used to see that the printed scale on the paper is parallel with the edge of the cylinder. The height of the pencil is next adjusted so that, the bottle being empty, the trace runs along the zero line of the blank paper, when the cylinder is turned by hand.

The float is also to be depressed by the finger and allowed to rise again in order to see that it is free to act throughout its whole range.

Great care should be exercised to avoid interfering with the instruments or their positions, but when any alteration of position, or interference with, or interruption of, their action, occurs, an explanatory note of the causes of all deficiencies should be made on the curves and tabulations.

Errors of Time and Date.

Observers should set their watches daily to correct G.M.T., either by reference to a standard clock, or to a chronometer corrected to the true time for the day by means of a table of going rates. The instrumental clocks should all be set to this correct time at the time of changing the papers, and comparisons should be made at every observation hour in order to see that no stoppage has occurred in the interval which has

changing the papers, the observer
the closing and opening of the
ing its duty.
be allowed to exceed two minutes

ily between the hours of 10 and
lers of the anemograph and rain-
nd thermograph. The observer
locks are stopped or the cylinders
d the indications of the dials and
urnals and on the reverse sides of
also be jotted down of the time
photographic sheets to be marked
e date, as a guide to the photo-
eing the outer.
uld be permanently and distinctly
, and the clock times and check
with the regulation pattern.
or places where the damping was
y.
rs and barometer should be made
ment coincident with the shutting
the even hour, and those of the
after the even hour.

thermometers the state of the wet
ments ought to receive attention.
fficient water is in the cistern to
visit of the observer, the sign ✓
the observation book and journal.
time of observation, a note should
unsatisfactory nature of the obser-
to damp the thermometer at once.
if possible, with a thin coating of
ater directly to the surface of the
e jacket evaporating or the tempe-
does not melt off the bulb quickly
rm water. This may also serve to
which might otherwise fail to act

at difficulty occurs in maintaining
n such cases the tank should be
lso new threads and muslin should
be fitted up. It is necessary to soak well or boil in water the threads and muslin before they are used in order to remove from them any gum or starch the presence of which seriously reduces the capillary actions.

The water supplied to the wet bulb cistern should, if possible, be rain water, and always be taken from a vessel exposed to the air, so that its temperature may be that of the air, this being of importance. The best plan is to save and use the water collected from the rain-gauge as being free from lime, which in the case of hard water forms an incrustation on the muslin ; when this is observed the muslin should be changed.

Flooding from excess of water often occurs when the cistern is refilled, vitiating the record for a quarter of an hour or more after replenishing.

The water cistern should, as a rule, be filled after reading the thermometers ; and it

Errors of Time and Date.

Observers should set their watches daily to correct G.M.T., either by reference to a standard clock, or to a chronometer corrected to the true time for the day by means of a table of going rates. The instrumental clocks should all be set to this correct time at the time of changing the papers, and comparisons should be made at every observation hour in order to see that no stoppage has occurred in the interval which has elapsed between the observations.

In the case of the photographic instruments, after changing the papers, the observer should, if possible, listen for the sounds produced by the closing and opening of the light shutter, which will show that it is duly performing its duty.

The error of the instrument clocks should never be allowed to exceed two minutes in the two days.

The instrumental clocks should all be wound daily between the hours of 10 and 11 a.m., fresh papers being placed daily on the cylinders of the anemograph and rain-gauge, and on alternate days on the barograph and thermograph. The observer should carefully note the exact time at which the clocks are stopped or the cylinders detached from the driving gear, and should also read the indications of the dials and time scales, noting them down at the time on the journals and on the reverse sides of the anemograph sheets. Similar memoranda should also be jotted down of the time which the instruments are again set in action. The photographic sheets to be marked with the initials B_1, B_2, and T_1, T_2, in addition to the date, as a guide to the photographer in his operations, the sheets marked B_1 T_1 being the outer.

As soon afterwards as time permits the dates should be permanently and distinctly written up in ink, the time scales, &c. stencilled on, and the clock times and check standard readings entered on the sheet in accordance with the regulation pattern.

The wet bulb thermogram should be examined for places where the damping was inefficiently performed, and remarks made accordingly.

Check observations of the standard thermometers and barometer should be made five times daily ; those of the thermometers at the moment coincident with the shutting off the light from the curve at two minutes before the even hour, and those of the barometer when the light is restored at two minutes after the even hour.

General Instructions.

WET-BULBS :—At the times of reading the standard thermometers the state of the wet bulbs of both the standard and self-recording instruments ought to receive attention. If both bulbs seem to be properly wetted, and sufficient water is in the cistern to maintain them in the same condition until the next visit of the observer, the sign √ should follow the entry of the standard reading in the observation book and journal. If either of the bulbs is wholly or partially dry at the time of observation, a note should be made to call the attention of the tabulator to the unsatisfactory nature of the observation at that hour, and the observer should proceed to damp the thermometer at once.

In time of frost the bulbs should be kept covered, if possible, with a thin coating of ice by applying, at frequent intervals, a little cold water directly to the surface of the bulb. When the air is too moist to allow of this ice jacket evaporating or the temperature is at or about the freezing point, and the ice does not melt off the bulb quickly enough, it should be melted off by using a little warm water. This may also serve to thaw the ice in the supply tank, tubes, and threads, which might otherwise fail to act properly.

In hot and dry weather it is sometimes found that difficulty occurs in maintaining the wet bulbs in a properly moistened condition, in such cases the tank should be refilled at more frequent intervals than usual, and also new threads and muslin should be fitted up. It is necessary to soak well or boil in water the threads and muslin before they are used in order to remove from them any gum or starch the presence of which seriously reduces the capillary actions.

The water supplied to the wet bulb cistern should, if possible, be rain water, and always be taken from a vessel exposed to the air, so that its temperature may be that of the air, this being of importance. The best plan is to save and use the water collected from the rain-gauge as being free from lime, which in the case of hard water forms an incrustation on the muslin ; when this is observed the muslin should be changed.

Flooding from excess of water often occurs when the cistern is refilled, vitiating the record for a quarter of an hour or more after replenishing.

The water cistern should, as a rule, be filled after reading the thermometers ; and it

is advisable to restrain the flow of water so that no more runs over the bulb than is requisite to keep it completely moistened. The lowest points of the thread should always be somewhat lower than the *points of attachment* of the thread to the thermometer bulb, so that the water rises to the bulb by capillary attraction. Notes of the times of adding water must be made on the curves.

ANEMOGRAPH :—Once a month, on a calm day, the orientation of the anemograph should be tested in order to see that the direction of the wind is being properly recorded, and that no slipping has taken place in any of the joints of the shafting. Opportunity should also be taken of this, to oil the instrument thoroughly, and to see that the bearings are free from dirt.

Full details as to how this is to be performed are given in a special circular of instruction which was issued in March, 1882.

RAIN GAUGE :—As regards the rain-gauge, particular care must be taken to change the recording papers every day at about the hour of 10 a.m.; the observer must never assume absence of rain in the 24 hours, as a shower may fall unnoticed during the night.

At the time of changing the rain-gauge papers the observer should always empty the contents of the receiver into the measuring glass, and compare the amount so measured with that indicated at the time by the curve, recording on the sheet the sum of the discharges *plus* the quantity so measured.

The measurement of snow by this gauge does not give very satisfactory results. Probably the best method is to collect the snow contained in the receiver into a vessel, and having melted it, to pour the water through the gauge in order to show the trace. In such cases the measurement of the hourly values should not be attempted, but the total amount entered at the latest hour to which the trace extends.

A spare gauge of the 8-inch pattern should be kept in the close vicinity of the Beckley gauge, and its contents must be measured immediately after the latter has been seen to.

Any material discrepancy between the indications of the two instruments should be noted in the weather journal, and endeavours made to ascertain its cause.

SUNSHINE RECORDER :—The cards are to be changed if possible at sunset each day, or if this is inconvenient, at some other fixed hour, which having been chosen, is to be adhered to as closely as possible.

The card is to be changed even if it has not been scored, and the identical card which was in the instrument returned to the Meteorological Office.

If the weather be windy it is advisable to insert a small wedge of paper so as to hold the card firmly in its groove.

In time of snow, when there is any chance of sunshine, the snow should be removed from the ball and from between the ball and the card. Hoar frost should also be removed from the ball as soon as possible, and the ball should occasionally be wiped to remove any dirt which may have become deposited upon it.

Every card should have clearly written upon it the name of the observatory, the date, and the time of insertion and withdrawal, using local apparent time; this is especially important if the cards are changed while the sun is shining. Should the instrument have been moved, or should anything have occurred to interfere with the accuracy of the score in any way, an explanatory note should always be written on the back of the card.

The cards are to be returned to the office as soon as possible after the close of each month. In packing them for transmission through the post they should always be kept flat and never be folded.

Further particulars as to the setting of the instruments, obtaining local apparent time, &c. will be found in a special circular issued January 1889, entitled "Directions for adjusting and using the Sunshine Recorder."

Tabulation of traces and discovery of errors.

Tabulation forms are provided for the entry of the measurements made from the automatic traces. These have to be suitably prepared for use by having written upon each of them on every page the name of the observatory and a consecutive number corresponding with that given in the diary issued by the Meteorological Office for each year. The dates are next entered, care being taken that they accord with the entries in the diary and journals, and also that each month's work is kept totally distinct

from any other. New forms throughout should be brought into use on the first day of every month.

Barograms.—The curve being duly written up and dated, is fixed in the tabulator frame and the scale fitted, the brass time-scale being adjusted so that the measuring bar-catch accords with the time gaps on the barograph curve indicating the even hours, in order that the reading glasses may be properly placed for the *odd* hours, not so indicated.

The reading glasses—the upper being set so that when the zero of the scale corresponds exactly to 30·0 ins. the distance between the cross lines on the two glasses shall agree with the scale value supplied by the Meteorological Office—are then moved until they stand tangential to the curve at both the upper and the lower margins, and the corresponding barometric pressure is then read off, and entered in the line and column of the tabulation form for the corresponding hour and day. This is done for every hour of the week's series of curves, and in accordance with the notes on the tabulation.

The absolute highest and lowest points shown on the curve for each day should also be noted and recorded.

A second series of tabulations of a less degree of refinement (to be employed as a check) follows, the readings being made by means of an ivory scale, read to the nearest hundredth of an inch only, and the readings are entered in a second blank form known as a Subsidiary Sheet. If possible the two sets of measurements should be taken by different persons.

The entries in the first form, in hundredths only, are then copied into the subsidiary sheet beside the other set. The differences are next taken, and when they exceed ·01 inch from the normal, a re-examination of the corresponding point on the curve is made, the faulty reading crossed through (not erased or altered), and the corrected value entered above it.

Should any portion of the curves be too faint for measurement with the ordinary tabulating instrument, but not for the ivory scale, it ought to be so measured, such measurements to be indicated in the tabulations by the addition of the word "approximate." On no account should the curves be pencilled or inked in.

The barogram readings should next be compared with the check observations of the standard barometer.

The readings of the standard having been corrected for index error and for capillarity, and reduced to 32°, should be entered in the "S" column of the tabulation form, *prior to the tabulation of the curve.* The values of the barograms, corresponding to the times at which the standards were read, should be measured and entered. The differences between each pair of these observations should then be taken for the period from 11 a.m. of one day to 11 a.m. of the next, and from the mean of all of these which do not vary as much as 0·008 in. from the average of the whole, a mean difference or "residual correction" for the period under discussion is formed. Should less than three standards be available, if it is not the day on which the curves are changed, the *residual* is calculated for the whole curve, but if it be changing day, it is calculated up to midnight of the following day. In extreme cases great range of pressure might modify this rule.

If the resulting mean difference be less than 0·001 in. it is considered that there is no residual correction, and the hourly values should be entered direct into the column headed "Tabulated value corrected." If a residual be formed they should be entered in the "H" column.

The residual correction is applied to all the tabulated values of the barogram, and the corrected values compared with the corresponding standard barometer readings. Where a difference exceeding 0·007 in. occurs, an examination of the accuracy of the curve measurements is made, and if this is found correct, the standard reading is concluded to be erroneous, and is marked on the tabulation sheet by means of brackets as (30·050). If necessary, on account of this rejection, a second residual correction is computed, applied to the original readings, and comparison with standards made anew.

Thermograms.—The thermograms are virtually registers of two separate instruments on one sheet of paper, and are, in the question of tabulation, treated as perfectly independent traces; dry bulb and wet bulb thermometer readings.

A thermogram is laid on a flat table, and covered by a glass scale engraved with two sets of parallel lines crossing one another at right angles, arranged to represent degrees of temperature and hours of time; the zero line of the curve is then made to lie along a previously determined line of the degree scale of the glass, whilst the lines crossing are made to correspond with the left-hand margin of the gaps in the curve indicating time.

The observer then having set his scale, and noticed that the indications of stopping and starting the curve are in accordance with the times indicated by the graduations on the glass, proceeds to read the position of the upper margin of the photographic sinuous line as referred to the degree lines every hour, and enter the readings on the corresponding tabulation form. This done for the whole week, the curves are again taken, and re-measured at each hour with an ivory scale, graduated to correspond with the glass scale. The readings of this scale are entered in a subsidiary sheet, as in the case of the barograms, and are compared with the corresponding readings already made by the glass scale, copied from the original tabulation into this sheet. When the difference between the two sets of measurements amounts to 0°·3, the curve is again read off at the point in question, the faulty reading struck through, and the correct one entered above it.

Next, the check observations of the standards, duly corrected for index error, are copied from the journals, and entered into the proper columns in the tabulations.

These are compared with the tabulated values, and if differences exceeding 0°·5 are found, those readings are examined, and, if necessary, the eye observations are struck out by being bracketed.

Finally, the points of maximum and minimum temperature each day are selected on the curves, and their values and times of occurrence noted and recorded.

A similar method of tabulation is pursued with regard to the trace of the wet bulb thermometer, but with the difference that the observer has to carefully guard against entry of observations for those hours when the curve is marked, indicating that the instrument has been acting improperly.

In the case of the wet bulb instrument, maxima and minima are not recorded.

Faint curves are to be treated as prescribed for the barograms.

Anemograph.—In this apparatus both velocity and direction of the wind are recorded mechanically on the same sheet of paper.

As the clock moving the recording cylinder is not provided with an automatic time-marker, the only guides as to correct timing of the traces are the positions of the two ends of the curves on the printed sheet, the observer should note that these correspond with the two small pin-holes made by a pricker attached to the instrument, which is depressed momentarily at the times of putting on and taking the sheet off the cylinder. If these do not accord within 10 minutes, with the times indicated by the ends of the traces, a fresh time scale must be ruled to agree with them, and the curves tabulated from the new scale.

The hourly wind velocity is measured with a glass scale, which gives the run of the Robinson cups from 30 minutes before to 30 minutes after each hour.

These values are entered in the tabulation sheet, and a correction for friction theoretically computed by Dr. Robinson applied to all velocities below 11 miles as follows:—

0 m.	- corr.	=	1·5 miles.
1 m. to 3 m.	„	=	1·0 „
4 m. to 10 m.	„	=	0·5 „

No subsidiary measurement is made for each hourly result, it being considered sufficient if the aggregate of the 24 uncorrected hourly velocities agrees within 5 miles with the whole distance run by the wind on the curve.

The wind's direction for every hour is deduced from the position of the centre of the trace, which constantly varies in width owing to the oscillations of the wind. For this purpose another scale is used engraved to accord with the scale printed upon the paper; should this slightly differ from that determined for each instrument by the operation of orientation performed monthly, due allowance must be made in setting the scale.

The subsidiary measurements in direction are made by inspection of the anemograms and entering on a form the special position of the traces marked thereon for each hour. The results are entered on a special form and compared with the readings obtained by the glass scale.

An examination should be made in all cases where there is a difference of two points between the two readings.

Beckley Rain Gauge.—This registers the time of fall of rain and the amount deposited in a funnel of 100 square inches area, placed 21 inches above the surface of the ground.

The rain from the funnel runs into a copper bottle floating on mercury, and, by its weight, depresses it. A pencil attached to the bottle is drawn by its descent down the paper wrapped round the drum.

When 20 cubic inches of water, corresponding to a rainfall of two-tenths of an inch, have been collected, a siphon causes the bottle to discharge, and the float rises to its first position again, carrying the pencil up to the zero of the curve ready to make another trace.

The pencil should be adjusted to press on the paper with such force that it may have sufficient power to make a good trace, but not such as to prevent its rising to the top of the form on the paper after a discharge assisted by a Stonyhurst lifter.

Measurements of the rain which has fallen during every hour are made from the curves by means of a glass scale. The hourly quantities should be entered in the tabulation form opposite the hour which indicates the end of the period to which the measurement refers, and the sum of the readings for the 24 hours should agree with the quantity gauged at the time of changing of the papers.

General.—The documents and curves should be forwarded to the Meteorological Office every Thursday as directed by the "Diary of Operations."

Regulations as to the Examination of the Tabulations at the Meteorological Office.

Assistant's Instructions.

General.

(1.) Examine each curve in order to see if there is any want of light, bagging, finger marks, or bad photography.

(2.) See that the clock and shutter have been in good action throughout the curve.

(3.) That the instrumental clock does not differ more than two minutes from the chronometer time as recorded on the curve.

(4.) That the date written on the back of the sheet agrees with that on the face, and that the days of the week and month at the top of the curve are correct.

(5.) That the sheet is properly written upon after the pattern.

(6.) That in the journals the proper day of the month is placed alongside of Sunday, and that the others follow consecutively.

(7.) That the times of starting and stopping the instrument as recorded on the journal have been properly entered on the curve.

(8.) Finally, ascertain, by inspection of the curve, that its times of beginning and ending are the same as those inscribed on the face of the sheet, and that no slipping of the cylinder has taken place.

Barograms.

(9.) See that the journal readings of the standard barometer have been correctly reduced to 32°, and are entered under their proper dates into the barograph tabulation sheets, differences of ·003 in. and upwards being noted as errors of reduction.

(10.) Compute the differences (S—T), (with their proper signs), between the standard reading (S) and the corresponding corrected hourly value of the barograph (T). In all cases of differences exceeding ·007 in. the hourly value should be checked, and if, on repetition, found to be correct, the standard reading should be rejected as probably faulty. The mean monthly differences should be recorded.

(11.) See that the tabulated hourly values have been correctly copied into column "A" of subsidiary sheets, and check the accuracy of the subtractions made in the tables occasionally.

(12.) Investigate all cases where A—B is ·02 in. greater than the normal difference; if an error be revealed in the tabulations, it ought to be corrected and noted at once.

(13.) By means of the ivory scale examine all cases where the differences between two consecutive hourly values amount to or exceed ·05 in. The values are to be corrected for errors of ·01 in. and upwards, a note thereof being made on the "Notes of Errors" Sheet. These corrections ought to be made before the next step in the process is commenced.

(14.) Ascertain the correctness of the computed residual correction, and whenever it is necessary to alter it, the last column of the tabulations should be corrected to correspond.

(15.) Check the accuracy with which the residual corrections have been applied, and correct any errors.

(16.) Make 40 re-measurements in every month's work for each observatory, selecting those parts of the curves most favourable for accurate measurements.

Thermograms.

(17.) See that the journal readings of the standard thermometers are entered under their proper dates into the thermograph tabulation sheets; and that they have been properly corrected for index error.

(18.) See that the tabulated hourly values have been correctly copied into column "A" of subsidiary sheets, and check the accuracy of the subtractions made in the tables occasionally.

(19.) Investigate all cases in which A—B is 0°·5 Fah. or more above the normal difference, and correct any errors.

(20.) Compute the differences (S—T), (with their proper signs), between the standard reading (S) and the corresponding hourly value of the thermogram (T).

(21.) In all cases of differences between "S" and "T" exceeding 0°·5, the hourly value should be checked, and if, on repetition, it be found to be correct, the standard reading should be rejected. The monthly mean differences between the simultaneous standard and thermograph readings should be recorded.

(22.) By means of the ivory scale, examine all cases where the difference between two consecutive hourly value amounts to, or exceeds, 5°·0. The values are to be corrected for errors of 0°·3, and when they amount to 0°·5 a note thereof is to be sent to the observatory.

(23.) Compare the dry-bulb readings with the corresponding wet ones, marking and examining all those cases in which the latter appear higher than the former.

(24.) Check the accuracy of the times and values of the maximum and minimum temperatures.

(25.) Make 40 re-measurements in every month's tabulations of both the dry and wet bulb traces for each observatory, selecting parts most favourable for accurate measurement.

(26.) Measurements for the purpose of checking the values of the zero lines are to be taken when the mean monthly difference amounts to ±0°·25, the said difference not being caused by errors in measurement, or reading of the standards.

Anemograms.

(27.) Examine each curve in order to see that both pencils work well and freely, that the paper has been accurately attached to the cylinder, and the cylinder has not slipped.

(28.) See that the times of starting and stopping the instrument, as recorded by the pricker and traces, do not differ more than five minutes from the chronometer time, inscribed on the sheet.

(29.) Inspect the direction and velocity wind curves in connexion with the tabulated results, in order to ascertain that each curve is tabulated under its proper date.

(30.) Examine all cases in which A—B is *two points* and upwards, and correct when necessary.

(31.) Examine all differences between two consecutive hourly values of velocity amounting to 10 miles.

(32.) Make 40 re-measurements in every month's work for each observatory, both for direction and velocity.

Rain Curves.

(33.) See that the clock has been in proper action; that the pencil has worked well and freely; that the paper has been properly attached to the cylinder; and that the cylinder has not slipped.

(34.) That the curve is properly written upon, and that the times of putting on and taking off, as shown by the trace, do not differ more than five minutes from the recorded times.

(35.) See that the total rainfall entered upon the curve agrees with that shown by the trace, and also with the record of the spare gauge.

(36.) That the trace has been tabulated from hour to hour, and make a general examination of the hourly values.

(37.) See that in tabulating, a proper allowance has been made for retardation of the pencil (through friction), bad attachment, bagging, &c.

GENERAL NOTE.

Whenever any error of time amounting to 10 minutes (and which has not been allowed for in tabulating) is discovered in a curve, re-tabulation will be necessary.

Curves erroneously tabulated should be returned to the observatories for re-tabulation.

Meteorological Office (Secretary).

The assistant shall report upon all curves and tabulations that are deficient from any cause, and the Secretary shall make the necessary communications to the Meteorological Council on the one hand, and to the director of the observatory where the failure occurred on the other, with any remarks that may tend in his estimation to obviate in future the causes of failure.

The Secretary shall also cause a tabulated report of the results of the examination of each month's work to be made to the Meteorological Council, and a copy of the "Notes of Errors" to be forwarded to each observatory concerned.

The foregoing regulations apply to the examination of the traces of self-recording instruments and the tabulation of the numerical values intended for final record and publication. But a general inspection of all the traces should be made immediately on their receipt, so that any defects apparent, on such an examination as can be made without instrumental appliances, may at once be brought to notice.

Submitted—The following statements of work during February 1889:—

MARINE BRANCH.

March 4, 1889.

Examined 19 new logs and 2 lighthouse registers.

Discussion of cyclones which crossed the Arabian Sea in May and June 1885. The charts for six weeks (May 15 to June 25), together with an extra sheet showing the conditions in the Gulf of Aden at 10 a.m., 4 p.m., 8 p.m., and Midnight, of June 3, have been reduced to the publishing size, and forwarded to the lithographer.

Preparation and extraction of data in the Red Sea contained in the logs of H.M.'s ships lent by the Admiralty.

Discussion of sea temperature, &c. in the neighbourhood of Cape Guardafui. The reduction of the working charts has been commenced.

Charting currents in all Oceans from the logs of H.M.'s ships.

Received from the lithographer proofs of mean pressure and sea temperature charts for all Oceans for the months of February, May, August, and November, for insertion in the new issue of "Instructions for keeping a Meteorological Log."

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH (to 28th February 1889).

Monthly Weather Report:—

The method of preparing and issuing these reports having been completely revised (Minutes, p. 102), their publication has again been taken in hand, during the last few days. The numbers for—

1887. Remain in same condition as at date of last report.

1888. *January* has been rearranged and printed; proof is under revise. All other numbers in hand are in same condition as at date of last report.

1889. *January*, prepared, and nearly ready for printer.

" *February*, just commenced.

The title under which those for 1888 and 1889 are being issued is now "Summary of the Observations made at the Stations included in the Daily and Weekly Weather Reports." The publication is now issued as a monthly supplement to the Weekly Weather Report.

Weekly Weather Report:—

1888. All the Appendices for this Report have been completed, passed through the press, and published.

1889. Weekly numbers in new enlarged form have all been issued promptly. Preparation of Appendices (four in number) is in hand.

Daily Weather Report:—All numbers issued promptly. The Monthly Summary of Observations made at the Telegraphic Reporting Stations, hitherto lithographed on the back of the "Corrections and Additions" sheet, is now issued in another form.

Hay Harvest Forecasts, 1888.—Checking completed.

Checking of Daily Forecasts.—Done to date.

Primary Checking of Storm Warnings issued.—Done to date.

Investigation as to Prevalence of Fog over the United Kingdom.—In hand again. Progress unavoidably slow at present.

Plotting of Daily Telegrams from the United States.—Given up for present.

The issue of the new Weekly Weather Report and the unsettled character of the weather have rendered progress with other parts of the work of that Department impossible.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

February 28th, 1889.

Observatory Returns.—Proof of Hourly Readings revised and signed for press to end of May 1886. The values copied, and the various means, &c. calculated, to the end of August 1886, and the "copy" sent to printer.

Harmonic Analyser.—Tables of mean coefficients for both pressure and temperature have been prepared, and a year's curves for two observatories have been re-analysed in consequence of an error in the setting of the instrument. The analysis of the barograms for 1881 completed for four stations.

Quarterly Weather Report.—The tables of depressions for Part I., 1880, completed, and the plates for the Appendix revised and passed for press.

Miscellaneous.—The comparison of the electrical anemograms with those of the ordinary instrument kept up to date, as was also the routine work of the room.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

March 1st, 1889.

Examinations.

May, June, July, 1887.—Completed.

Falmouth and *Kew* Rainfall, 1888.—The rain-curves for the year.

Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

May–July 1887.—"*Notes of Errors*" to all observatories and monthly reports thereon; also report on the work of the six months January–June, 1887.

(Signed) T. E. ALLEN.

Reported—That the Monthly Supplement to the Weekly Weather Report for January 1889 had gone to press.

Reported.—That the cash accounts for the six months ended the 30th September 1888 had been audited by the chairman and Mr. Galton on the 25th February, and had been sent to the Treasury, for the Audit Office. The receipts for the six months, exclusive of a balance of 2,961*l.* 4*s.* 11*d.* on the 1st April 1888, amounted to 7,490*l.* 3*s.* 7*d.* The payments amounted to 6,869*l.* 0*l.* 6*d.* leaving a balance of 3,582*l.* 8*s.* in hand and at the bank on the 1st October last.

Submitted the following:—

LIST OF PUBLICATIONS received since the last Meeting.

Climatology of New Jersey. By John C. Smock.

Rainfall in South Australia and the Northern Territory during 1887; . . . by C. Todd.

Über den täglichen und jährlichen Gang und die Vertheilung der Windgeschwindigkeiten im Russische Reiche, von J. Kiersnowskij. (Repert. Meteor. Bd. xii., No. 3.)

Submitted—The following report on the 8.30 p.m. forecasts for February 1889:—

The letters used have the following signification:—

a=complete success.
b=partial (*i.e.* more than half) success.
c=partial failure.
d=total failure.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success. a + b.
Scotland, N.	a	29	79	54	92
,,	b	57	18	38	
,,	c	7	3	5	
,,	d	7	0	3	
Scotland, E.	a	39	68	54	90
,,	b	47	25	36	
,,	c	14	7	10	
,,	d	0	0	0	
England, N.E.	a	43	57	50	88
,,	b	46	29	38	
,,	c	7	7	7	
,,	d	4	7	5	
England, E.	a	50	72	61	88
,,	b	32	21	27	
,,	c	7	7	7	
,,	d	11	0	5	
Midland Counties	a	36	64	50	86
,,	b	43	29	36	
,,	c	14	4	9	
,,	d	7	3	5	
England, S.	a	39	68	54	89
,,	b	46	25	35	
,,	c	11	4	8	
,,	d	4	3	3	
Scotland, W.	a	43	54	49	84
,,	b	39	32	35	
,,	c	18	7	13	
,,	d	0	7	3	
England, N.W.	a	46	39	43	79
,,	b	29	43	36	
,,	c	21	7	14	
,,	d	4	11	7	
England, S.W.	a	39	54	47	84
,,	b	43	32	37	
,,	c	7	7	7	
,,	d	11	7	9	
Ireland, N.	a	22	57	40	83
,,	b	57	29	43	
,,	c	14	4	9	
,,	d	7	10	8	
Ireland, S.	a	32	43	38	81
,,	b	43	43	43	
,,	c	21	7	14	
,,	d	4	7	5	
Summary.					
British Isles	a	38	60	49	86
,,	b	44	29	37	
,,	c	13	6	9	
,,	d	5	5	5	

Submitted—The following memorandum :—

HAY HARVEST FORECASTS, 1888.

Meteorological Office, Telegraph Branch,
March 7, 1889.

SIR,

I BEG to submit, herewith, the results of the checking of the Hay Harvest Forecasts issued during the hay-making period of 1888.

The telegrams were transmitted daily between 3.30 p.m. and 4 p.m. on each week-day for about five weeks, beginning on 11th June in England South and East, and ending on the 25th August over the greater part of Scotland.

The general percentage of successful forecasts (84), though, as might be expected, lower than in 1887, was nevertheless as high as in the fine season of 1886, and higher than in 1885.

The largest general percentage (92) was reached in England S., while the smallest (77) was in England N.E.; the relatively low percentage in the latter district is not easily explained.

In addition to the above there were sent similar telegrams to seven other gentlemen, at their own cost, for periods of varying length. Colonel Turbervill had the forecasts continued at his own expense during the corn harvest, and four other gentlemen asked for a continuance of the telegrams. One of the subscribers, Mr. Fergusson of Thetford, says the forecasts have been very correct.

In Table II. will be found notes added by several of the recipients, speaking in high terms of the forecasts.

When it is borne in mind how very wet and changeable the season was, when compared with that of 1887, it appears that the falling off in the percentage of success this year was smaller than might have been expected.

I am, &c.
(Signed) FREDC. GASTER.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

SUMMARY of RESULTS.

Districts.	Names of Stations.	Percentages.				Total Percentage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N. - -	Golspie and Munlochy - -	48	34	17	1	82
SCOTLAND, E. - -	Glamis, North Berwick, Rothiemay, and Aberfeldy.	43	41	11	5	84
ENGLAND, N.E. -	Chatton and Ulceby - -	50	27	17	6	77
ENGLAND, E. - -	Thorpe and Rothamsted -	48	39	10	3	87
MIDLAND COUNTIES -	Cirencester and East Retford -	53	32	9	6	85
ENGLAND, S. - -	Maidstone, Downton, and Horsham	52	40	6	2	92
SCOTLAND, W. -	Dumbarton, Stranraer, and Islay	45	41	8	6	86
ENGLAND, N.W. -	Leyburn and Prescot - -	57	24	11	8	81
ENGLAND, S.W. -	Bridgend (Glamorganshire) Spring Park (Gloucestershire), Clifton, and Glastonbury.	46	36	13	5	80
IRELAND, N. - -	Moynalty and Hollymount -	43	38	14	5	81
IRELAND, S. - -	Moneygall, Kilkenny, and Ardfert Abbey.	53	31	10	6	84
	Mean for all districts - -	49	35	11	5	84

HAY HARVEST FORECASTS, 1888.

RETURN showing the NUMBER of FORECASTS sent to each of the under-mentioned PERSONS, with the SUCCESS or otherwise of the FORECASTS.

Districts.	To whom sent.	Address.	No. of Forecasts sent.	No. of Forecasts checked.	Percentages.				Remarks.
					Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
0. SCOTLAND, N.	Rev. Dr. Joass	Golspie	34	34	53·0	29·4	14·7	2·9	The Rev. Dr. Joass, of Golspie, remarks that "the forecasts were much appreciated."
	Major Smith	Munlochy, Inverness	33	33	42·4	39·4	18·2	—	
1. SCOTLAND, E.	J. Whitton	Glamis, by Forfar	30	30	33·4	53·3	10·0	3·3	
	W. W. Kerr	Ferrygate, North Berwick	27	24	37·5	45·8	8·3	8·4	
	G. Murdock	Rothiemay, Huntley	30	24	62·5	29·1	4·2	4·2	
	C. W. L. Forbes	Aberfeldy	30	30	36·7	36·7	23·3	3·3	
2. ENGLAND, N.E.	J. Wilson	Chillingham Barns, Chatton, Northumberland.	30	30	53·3	30·0	13·4	3·3	
	J. Turner	The Grange, Ulceby	35	36	47·2	25·0	19·5	8·3	Mr. Turner, of Ulceby, says "the telegrams have been appreciated."
3. ENGLAND, E.	W. Birkbeck	High House, Thorpe, Norwich	30	30	56·6	30·0	6·7	6·7	
	Sir J. B. Lawes, Bart.	Rothamsted, Harpenden	42	23	39·1	47·8	13·1	—	
4. MIDLAND COUNTIES	Prof. Ohm	Royal Agricultural College, Cirencester.	30	29	62·1	31·0	6·9	—	
	E. E. Harcourt-Vernon	Grove Hall, East Retford	36	9	44·5	33·3	11·1	11·1	Returns very incomplete.
5. ENGLAND, S.	C. Whitehead	Barming House, Maidstone	42	42	57·1	38·1	2·4	2·4	
	E. P. Squarey	The Moot, Downton, Wilts	42	42	54·8	40·5	4·7	—	
	G. M. Allender	Stammerham, Horsham	42	19	45·2	42·9	9·5	2·4	
6. SCOTLAND, W.	W. Calder	Castlehill, Dalreock, Dumbarton	30	30	50·0	30·0	13·3	6·7	
	M. J. Stewart, M.P.	Ardwell, Stranraer	33	33	45·5	42·4	3·0	9·1	
	J. S. R. Ballingal	Eallabus House, Islay	30	29	37·9	51·7	6·9	3·5	
7. ENGLAND, N.W.	G. W. Wray	Leyburn, Yorkshire	36	35	54·3	31·4	8·6	5·7	Mr. Wray, of Leyburn, asked for a continuance, and said "the forecasts had been generally correct, and much appreciated."
	The Earl of Derby, K.G.	Knowsley Hall, Prescot	30	30	60·0	16·7	13·3	10·0	
	Col. T. B. Turbervill	Ewenny Priory, Bridgend, Glamorganshire.	30	29	41·4	34·5	20·7	3·4	
8. ENGLAND, S.W.	The Earl of Ducie	Spring Park, Falfield, S.O., Gloucestershire.	36	36	47·2	38·9	8·3	5·6	
	T. Dyke	Long Ashton, Clifton, Bristol	30	30	50·0	33·3	13·3	3·4	
	R. Neville Grenville	Butleigh Court, Glastonbury	52	52	46·2	38·5	9·6	5·7	Mr. Neville Grenville requested a continuance, and remarked, "So far they have been excellent, and people take great interest in them."
9. IRELAND, N.	E. F. Farrell	Moynalty, Co. Meath	30	30	43·3	40·0	13·3	3·4	
	The Rev. Canon Nesbitt	Hollymount Rectory, Co. Mayo	34	28	42·9	35·7	14·3	7·1	
10. IRELAND, S.	D. A. M'Cready	Larchvale, Moneygall, King's Co.	30	30	36·7	40·0	13·3	10·0	
	D. A. Milward	Lavistown, Kilkenny	42	42	61·9	26·2	4·8	7·1	Mr. Milward says, "They have been very correct."
	W. Talbot Crosbie, D.L.	Ardfert Abbey, Tralee, Co. Kerry	30	30	60·0	26·7	13·3	—	

Reported—That the following cheques had been drawn during the month of February:—

1889.			£	s.	d.
Feb.	2nd.	J. S. Harding, junr., for payment of weekly salaries	16	0	6
,,	,,	Hamburg M.O., telegrams*	18	0	9
,,	4th.	Spottiswoode & Co., use of Prawle Point wire	17	0	0
,,	9th.	J. S. Harding, junr., for payment of weekly salaries	16	0	6
,,	16th.	,, ,, ,,	16	0	6
,,	18th.	Paris M.O., telegrams*	4	5	4
,,	22nd.	Pall Mall Coal Co., coals	8	16	0
,,	,,	Chance Bros., sunshine balls	10	13	9
,,	,,	Post Office, telegrams and private wire	168	17	11
,,	23rd.	J. S. Harding, junr., for payment of weekly salaries	16	0	6
,,	28th.	R. H. Scott, secretary	66	13	4
,,	,,	J. S. Harding, junr. } Office salaries	27	15	6
,,	,,	T. D. Bell } Office salaries	16	5	0
,,	,,	Captain H. Toynbee, pension	12	0	0
,,	,,	J. Sheerman, salary (harmonic analysis)	11	5	0
,,	,,	J. E. Cullum, salary (Valencia observatory)	19	3	4
,,	,,	R. H. Curtis } Salaries (discussion, &c. of observations)	22	18	4
,,	,,	J. A. Curtis } Salaries (discussion, &c. of observations)	18	15	0
,,	,,	T. E. Allen } Salaries (discussion, &c. of observations)	16	13	4
,,	,,	C. H. Thompson } Salaries (discussion, &c. of observations)	12	10	0
,,	,,	S. Call } Salaries (discussion, &c. of observations)	12	1	8
,,	,,	R. G. Canham } Salaries (discussion, &c. of observations)	7	18	4
,,	,,	A. H. Bell } Salaries (discussion, &c. of observations)	7	18	4
,,	,,	L. H. Powers } Salaries (discussion, &c. of observations)	4	11	8
,,	,,	F. Gaster } Salaries (preparation, &c. of Weather Reports)	25	15	7
,,	,,	F. J. Brodie } Salaries (preparation, &c. of Weather Reports)	18	15	0
,,	,,	G. G. Francis } Salaries (preparation, &c. of Weather Reports)	18	5	7
,,	,,	A. J. Rigby } Salaries (preparation, &c. of Weather Reports)	17	16	3
,,	,,	R. Sargeant } Salaries (preparation, &c. of Weather Reports)	12	13	1
,,	,,	A. R. Simpkins } Salaries (preparation, &c. of Weather Reports)	10	6	3
,,	,,	C. W. Heinemann } Salaries (preparation, &c. of Weather Reports)	5	8	4
,,	,,	Nav.-Lieut. C. W. Baillie, R.N. } Salaries (discussion, &c. of observations and care of instruments)	29	3	4
,,	,,	R. Strachan } Salaries (discussion, &c. of observations and care of instruments)	27	15	6
,,	,,	C. Harding } Salaries (discussion, &c. of observations and care of instruments)	22	18	4
,,	,,	H. Harries } Salaries (discussion, &c. of observations and care of instruments)	15	8	4
,,	,,	W. Allingham } Salaries (discussion, &c. of observations and care of instruments)	15	8	4
,,	,,	W. G. James } Salaries (discussion, &c. of observations and care of instruments)	11	13	4
,,	,,	F. T. Bullen } Salaries (discussion, &c. of observations and care of instruments)	9	3	4
,,	,,	R. F. Wallace } Salaries (discussion, &c. of observations and care of instruments)	9	3	4
,,	,,	J. S. Harding, jun., petty cash	50	0	0
,,	,,	J. E. Cullum, Valencia expenses	14	1	6
,,	,,	F. Gaster, for payment of allowances for extra attendance	15	10	0
			£877	10	0

* Paid by draft on a foreign banker.

63, *Victoria Street, March* 20, 1889.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. BUCHAN. | MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (March 6) were read and confirmed.

Read—The following letter:—

(M.O. 480.)

SIR, Treasury Chambers, March 11, 1889.

THE Lords Commissioners of Her Majesty's Treasury have before them a letter from the Controller of the Stationery Office asking for directions as to the limits within which the demands of the Council for printing, &c. are to be complied with by the Stationery Office without special sanction of this Board.

On reference to the figures given in the annual estimates, and putting aside the cost of printing the report, which is about covered by the proceeds of its sale, my Lords find that the average printing expenditure during the last 10 years is about 2,400*l.* per annum; the average of the first three years being 1,250*l.*, and that of the last seven, 2,850*l.* a year.

The great increase in the expenditure appears to have taken place in 1881–2 and in 1882–3, of the cause of which their Lordships have at present no explanation.

Except in 1884–5, when, as my Lords understand, a special work was issued, the expenditure in each of the last six years appears to have remained without material change.

The expense of this service is so considerable, that before giving instructions as to its supply, my Lords will be glad to have before them such observations as the Council may desire to offer as to the probable nature and extent of their future demands for printing, &c. My Lords think it right to state, that if it were contemplated that the annual outlay would further increase, they would have to consider, as an alternative, whether it would not be possible to fix a maximum limit for work to be done by the Stationery Office within the year, or to allow to the Council a fixed sum in lieu of the free printing at present enjoyed by them.

In connexion with this subject, the Controller of the Stationery Office has called the attention of this Board to an alteration which has recently been made in the size of the Weekly Weather Reports and Charts issued by the Council, whereby the cost of the publication will be raised from 273*l.* to 546*l.*

My Lords will be glad to be favoured with the opinion of the Council as to whether this very considerable increase of cost will be justified by a corresponding advantage to the public.

I am, &c.

(Signed) FRANK MOWATT.

The Secretary of the Meteorological Council,
116, Victoria Street, S.W.

Mr. Scott reported that, by the Chairman's instructions, he had, on the 15th instant, written to the Stationery Office (P.C. 557), inquiring the cost of the several larger publications issued by the Office within the last three years.

Read—Letters 476 and 519 from Mr. Cullum, stating that the electrical anemometer at Valencia had worked fairly satisfactorily during the last fortnight, and also a letter, No. 458, from Messrs. Fuller & Co., stating that the cost of the batteries required would be about 30*l.* (p. 111).

It was resolved that the instrument be continued in action at Valencia as long as the present batteries last (P.C. 603).

Read—The following memorandum as to the tabulation of anemograms, as requested at last meeting:—

MEMORANDUM on the MEASUREMENT of SQUALLS shown on the TRACES yielded by "ROBINSON" ANEMOMETERS.

In attempting to make measurements of squalls from the traces yielded by our standard-pattern anemometers, it is necessary to bear in mind three points connected with the instrument itself, each of which tends to limit the amount of reliance which can fairly be placed upon the results obtained, and also to make the operation of measuring more or less one of difficulty.

The first of these points is the cramped time-scale of the curves, in which an hour is represented by a space of less than four tenths of an inch, strictly by ·365 inch.

The second is the enormous reduction undergone by the revolutions of the cups before they are registered upon the papers. The circular path of the centre of one of the cups is 12·57 feet, and therefore since we still adopt Dr. Robinson's factor (3) for the relation between the velocity of the cups to that of the wind, one revolution of the cups is taken to indicate a horizontal movement of the air of 12·57 yards, and 7,000 revolutions will be required for the passage of every 50 miles of wind over the cups:—12·57 × 7,000 = 87,990 yards, = 50 miles very nearly. But by means of a train of wheels this number of revolutions of the cups is reduced to *one*, and causes one turn of the cylinder carrying the spiral which makes the trace upon the curve as a piece of line 2·75 inches in vertical length.

The third point is also very important, namely, that the trace itself which is made by the pencil on the paper is not a fine, sharply-defined line, such as might be made by a pointed pencil, but a broad and rather ill-defined mark about ·04 inch wide, produced by the combined movements of the spiral pencil as it is turned by the wind upon the paper, and of the paper as it is moved under the pencil by the clock.

The method adopted for tabulating the anemograms is to measure the number of miles recorded during 60 consecutive minutes. By this plan we practically obtain the mean velocity for the hour, and it is therefore not adapted for giving a just idea of a gale, either as regards its maximum strength or its gustiness, the latter being a most important point to determine in any inquiry as to the destructive power of a gale.

It is quite true that it is only within certain limits that the traces of the Robinson anemometer can be used for obtaining information on these points, but an examination of the traces themselves will readily show that in many cases a great deal more can be got from them than is at present sought for.

In nearly every curve there may be seen certain deviations of a more or less marked character in the angle which the trace makes with the time lines. Each of these indicates a variation in the velocity of the wind, and they are therefore, under certain circumstances, of considerable importance, *e.g.*, as when it is desired to ascertain whether, during a gale, the wind attained to an extreme strength, beyond anything, that is to say, which the hourly totals measured would indicate. These features of the curves are sometimes with strong winds very marked, and it is these which we are accustomed to speak of—I think erroneously—as "squalls."

But the ordinary squall, the sudden isolated gust of wind, lasting generally for only a few seconds, is of far too brief duration to produce any appreciable effect upon a trace made under such conditions as those just pointed out, and therefore it may be said at once that singly they cannot be detected upon these anemograms. No doubt during the continuance of such gusts the velocity of the cups becomes very high indeed; but even assuming it to reach such a rate as 250 miles per hour, in which case the cups should make 10 revolutions per second, and to maintain that rate for 15 seconds—which is probably an extremely liberal allowance in both directions—we should then register only one mile of wind, which would be shown by a piece of trace only ·055 inch in length and almost as broad as it was long.

There is no doubt that gales of wind differ a good deal in character as regards the prevalence of squalls, some being remarkable for the frequency and strength of the gusts, while in others this feature is comparatively rare. The records of the "bridled" anemometer, however, enable us to learn a good deal about them, and of the way in which they probably influence the anemograms of the "Robinson" cup instrument. What ordinarily takes place seems to be much as follows:—

First of all there is a fluctuation of the wind within certain limits (which varies in nearly every gale) above and below its average strength, the variations following each other in quick succession so that even on the bridled anemogram, which has a very open time-scale, it is impossible to pick out any individual one except when the exceptionally wide time-scale, which can be used when desired, is in operation. The resulting trace is a broad mass of shading produced by the rapid oscillations of the pencil, the width of the belt of shading depending upon the average strength of these minor gusts.

In addition to these there are always a number of heavier gusts which cause the pencil to pass beyond the upper limits of the shaded belt, and which occur at longer intervals, say of a few minutes, although not unfrequently a number of them will succeed each other very quickly. The strength and frequency of these squalls varies very much in different gales, being only rarely experienced in some, while in others they are extremely frequent and strong,—with perhaps a few of very exceptional strength. The very open time-scale which can be used at pleasure with the bridled anemometer allows these variations of force to be quite distinctly seen and followed.

From this, therefore, it would seem that the main portion of the traces of the Robinson instrument is really built up of a succession of tiny pieces of line inclined at varying angles to the hour-lines, but each piece so small that with the conditions under which the trace is made they cannot be separately distinguished, and they therefore form in the aggregate a line which roughly approximates more or less to a straight line, and which by summing up the gusts and lulls gives at least an approximation to the average velocity over the period selected for measurement.

When, however, the squalls are more than usually heavy and frequent, they are able to produce an effect upon the trace of the Robinson instrument which can be distinctly seen, the inclination of the trace being altered over a space sufficiently great to allow in many cases of its being measured with considerable accuracy. These are the appearances of the line which we commonly call

"squalls," but which would probably be more correctly described as due to a *succession of squalls* rather than to one.

That these deviations of the line are sufficiently well defined to be readily recognised and dealt with, and that they are also of sufficient importance as to be worthy of measurement, the following specimens, not reproduced here, traced from a few Holyhead and Yarmouth curves will show.

The first of these examples shows how easily the hourly measurements may give a totally wrong idea of the wind-force, the two hourly measurements of 11 miles, which were recorded here, hiding altogether the fact that for a portion of the time the velocity was fully 35 miles per hour.

With reference to the method which should be adopted for measuring these "squalls," it is clear that, first of all, care must be taken to avoid any chance of mistaking deviations of the line due to mechanical defects for those really caused by augmentations of the wind velocity. This, however, is easily guarded against by a little intelligent inspection of the curve, since such faults nearly always repeat themselves at corresponding portions of every line. Further, since with high velocities, very small differences of angle in the trace make large differences in the corresponding velocities, no piece of line should, as a rule, be measured which is under certain minimum dimensions, say, of 10 minutes of the horizontal, or of 10 miles of the vertical scale.

For the measurements themselves the plan which I have myself adopted appears to me, after a good many trials of it and of others, to be the best and easiest, viz., to lay a line etched on a glass plate fairly along the centre of the portion of trace to be measured, and by means of an arc attached to note the angle it makes with the time-lines, and then from a table of corresponding velocities take out the hourly rate to which it is equivalent.

For the purpose, however, of quickly deciding whether a piece of trace reaches the given minimum limit of 10 miles in 15 minutes, which the Council recently decided to fix, I have upon the same scale etched a line enclosing a space of 10 minutes in one direction and of 10 miles in the other, and this being moved across a curve will readily show whether any portion of it reaches the minimum fixed.

The amount of time which would be required for tabulating these squalls will of course depend upon the way in which it is decided to do the work. But if it is only required to note whether at such times as the storm signals are hoisted any portion of the trace indicates a velocity of 10 miles in 15 minutes, and not to measure the squalls more closely or at any other time, then the amount of time required will be very small,—probably not more than two or three hours per month.

In conclusion, however, I would like to add that although these "squalls" are really indications of important increases of wind-force—caused by actual revolutions of the cups and not due to mechanical eccentricities,—yet it ought to be remembered that absolutely nothing is known about instrumental errors at such high velocities as they indicate; and further that when with lower velocities we speak of so many miles per hour we quote velocities which we know to be too high, since all recent investigations have shown Dr. Robinson's factor to be about one-sixth too great.

R. H. Scott, Esq., F.R.S. (Signed) R. H. CURTIS.

General Strachey reported that he had examined Mr. Whipple's paper on the reduction of cloud observations. He was not disposed to recommend the continuance of Mr. Whipple's mode of reduction, while recognising the zeal Mr. Whipple had displayed in the inquiry (P.C. 664).

Read—A memorandum from Mr. Baillie, reporting that since last meeting four logs had been received, three of them being "excellent." Mr. Scott was instructed to express the best thanks of the Council to these observers.

Mr. Buchan communicated to the Council that he had spent some time in the Office in consideration of the system of issue and checking of storm warnings. Various changes in the arrangements for issue had been suggested to be carried out if the Post Office authorities raised no objection.

It was proposed that instead of the ten districts into which the coasts are now divided, the following be the districts :—

Scotland, N.E.	Scotland, W.
,, E.	Irish Sea.
England, N.E.	St. George's Channel.
,, E.	Bristol Channel.
,, S.E.	Ireland, N.W.
,, S.	,, S.W.
,, S.W.	

In addition various changes should be made in the way of increasing the amount of information obtained from lighthouses, so as to improve the existing records of storms.

Submitted—The following summary, as a result of the primary checking of the storm warnings issued to the coasts of the British Islands, since the last meeting of the Council:—

1. WARNINGS ISSUED.

SUMMARY.

A + B (successful) - - -	-=10
C (failures) - - -	-= 6

2. GALES EXPERIENCED, BUT FOR WHICH NO WARNING WAS ISSUED.

None.

FREDC. GASTER.

Telegraphic Branch,
20th March 1889.

Submitted—The following List of Publications which had been received since the last meeting:—

Rainfall in the East Indian Archipelago, 1887. By Dr. J. P. Van Der Stok.

Observations made at the magnetical and meteorological observatory at Batavia. Vol. viii. 1883–1885. x. 1887.

Messungen der Ausstrahlung auf dem hohen Sonnblick im Februar 1888 von Dr. J. M. Pernter. (Sitzungsb. k. Akad. Wissensch. Wien, Bd. xcvii.)

Scintillometer-Beobachtungen auf dem hohen Sonnblick (3095 m) im Februar 1888 von Dr. J. M. Pernter. (Sitzungsb. k. Akad. Wissensch. Wien, Bd. xcvii.)

Brief sketch of the meteorology of the Bombay Presidency in 1887–88.

R. Osservatorio astronomico di Brera in Milano. Osservazioni meteorologiche eseguite nell' anno 1888 . . . da E. Pini.

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